DOCUMENT RESUME

ED 127 453 CE 007 632

AUTHOR Pardig, Glen E.
TITLE Handbook for the Development of Vocational Education Modules.
INSTITUTION Kentucky Univ., Lexington. Vocational Education Curriculum Development Center.
PUB DATE Apr 75
NOTE 58p.

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS *Curriculum Development; Guides; *Individualized Instruction; *Instructional Materials; Manuals; Material Development; *Performance Based Education; Teaching Techniques; *Vocational Education; Writing

ABSTRACT

This handbook was written primarily to assist module developers working in the Kentucky Competency-Based Curriculum Project. It was also prepared to help module developers in other areas of education as well as to help administrators who would be installing programs of this type in their schools. This handbook provides an explanation of competency-based-vocational education and a glossary of terms. Separate sections describe the components of a module and the format: Title, Introduction, Directions, Objectives, Series of Learning Activities, Special Learning Materials, Instruction Sheets, Student Self-Checks, and an Instructor's Final Checklist. Exemplary samples of each component are given. Guidelines and suggestions for writing each component, for choosing and developing instructional illustrations and media material, and for evaluating modules are also included. (HD)

HANDBOOK
FOR THE DEVELOPMENT OF
VOCATIONAL EDUCATION MODULES

Glen E. Fardig
Curriculum Development Center for Kentucky
The University of Kentucky
152 Taylor Education Building
Lexington, Kentucky 40506

April 1975

CONTENTS

Overview of the Handbook

This HANDBOOK has been written primarily for the assistance of the module developers working in the Kentucky Competency-Based Curriculum Project. It is also intended to be of help to module developers in other areas of education, and to administrators who will be installing competency-based programs in their schools.

The HANDBOOK describes the content of each of the components of a module, and explains the format to be used. It also gives guidelines and suggestions for writing each component to aid the module writer in producing effective instructional packages within the established framework of competency-based education.

Along with the descriptive material are exemplary samples of each component. These examples appear on colored paper in the text. The vocational program to which the example applies is indicated in brackets.

Competency-Based Vocational Education

The Kentucky Bureau of Vocational Education and the Curriculum Development Center for Kentucky have made a serious commitment to the concepts of competency-based education (CBE) and to the belief that CBE can make a significant contribution toward the improvement of vocational education in the Commonwealth. The development of individualized instructional materials for a number of specific occupational programs is an indication of that commitment.

The CBE effort began with the selection of an initial group of occupations that were considered to be of high priority in terms of the manpower training needs of the state. As the first step in the CBE curriculum development process it was necessary to identify the competencies needed by occupational workers as they function on the job and, therefore, the competencies to be included in the instructional program. The term "competence" does not refer solely to specific knowledge and skills, but may also include more complex abilities such as being able to think logically, organize work, and appreciate workmanship.

These essential tasks, or competencies, were validated by asking incumbent workers in the target occupations exactly what they do. The resultant list of competencies was translated into a catalog of performance objectives on which the competency-based instructional program is built. A criterion-referenced measure and a standard describe what the vocational student must do to demonstrate that he or she has mastered the performance required in the objective and thus acquired the necessary competence. The objectives and criterion-referenced measures become the basis for the materials of instruction for a

competency-based educational program.

Competency-based vocational education programs are programs in which the performance objectives are specified, and agreed to, in rigorous detail in advance of instruction. Students know what they are expected to be able to do before they complete the program and what standards of workmanship will be demanded of them. Each student is held accountable not for simply achieving passing grades, but for attaining at least a given minimum level of competency in performing the essential tasks of the occupation. The student must demonstrate his competency by performing the task while the instructor rates the performance, using a checklist or other objective measure.

Because students have a great range of abilities, learning styles, and motivation, some will take longer than others to achieve the required competencies. To allow each student to progress at his own rate, it therefore becomes desirable to individualize the instruction. Traditional instructional patterns of group demonstration, group testing, and unit organization do not work very well in competency-based education. Individualized instruction can be effectively achieved by devising student learning packages, called modules. The module is designed for student use and provides the student with the objectives he is asked to achieve. It also lists a sequence of activities to help him learn the competence and outlines an objectively rated performance that will allow him to demonstrate his proficiency.

In fully individualized programs, the amount of time students are enrolled in a vocational program is not the standard by which they are certified as being ready to enter an occupation. The students will be considered as having successfully completed the program when, and only when, they have demonstrated their ability to perform the competencies

that have been identified for their career goals.

While the instructional module is the most important and most obvious component of the competency-based curriculum, there are a number of other supporting components in the system:

Supporting instructional materials for students include slide-tapes, audiotapes , reference books, and models.

Supporting instructional facilities include study carrels, sound slide projectors, and related equipment needed to help the student complete the modules.

The instructor's manual is a guide for classroom instructors, which is designed to aid them as they work with students in the modularized program

A program management system outlines procedures for installing the competency-based curriculum and management techniques to keep it progressing smoothly.

Orientation and training provides initial in-service education for instructors as they become responsible for directing competency-based programs.

Competency-based education, then, is not simply a collection of instructional modules for students, but a total system for planning, developing, and implementing a curriculum designed to ensure that students acquire the knowledge, skills, and attitudes essential for successful job performance.

Glossary of Terms

Competency. A skill, either cognitive or psychomotor, which is required in the vocation and which the student is expected to learn and demonstrate in the educational program.

Competency-based education (also called performance-based education). An education program in which the competencies (or skills) to be acquired and demonstrated by the student, as well as the criteria to be applied in assessing the competencies, are made explicit. The student is held accountable for meeting those criteria.

Performance objective. A statement which specifies a competency a student is to acquire and demonstrate.

Affective objective. A statement which specifies an affective characteristic (value, attitude, commitment, response) that a student is expected to acquire and demonstrate.

Instructional module. A set of learning activities in organized physical form intended to facilitate the students' acquisition and demonstration of a particular competency or group of related competencies.

Learning packages. Instructional modules which are combined with other learning resources in order to provide complete experiences and to facilitate acquiring competencies.

Prerequisites. Those competencies a student is expected to demonstrate before he begins to work on a particular instructional module.

Learning activities (also called learning experiences). Activities or experiences which are made available to a student to help him master an objective or set of objectives.

Feedback (or knowledge of results). Procedures by which the student is informed of his progress, areas of weakness, or his level of success in demonstrating the desired competencies.

Final assessment procedures. Measuring processes which are used to determine the student's level of mastery relevant to a specified objective or set of objectives following instruction intended to facilitate his achievement of mastery.

Components of the Modules

A standard module format has been adopted for use in all the occupational areas. It has been designed to ensure uniformity of appearance and consistency of approach. By following the module format, the writers will have fewer routine decisions to make and can concentrate on the instructional content of the module. Writers should follow the standard format given in the directions and the examples as closely as possible. The specific content, of course, will be unique to each module.

Each module contains the following components:

- A title
- An Introduction
- Directions
- Objectives
- A series of Learning Activities
- Special Learning Materials

    Instruction Sheets
    Student Self-Checks
    An Instructor's Final Checklist

Directions for the learning activities and the materials in the special learning materials should be clear, simple, and straightforward. The modules are designed to be as self-instructional as possible, so that the student should not need to ask the instructor for clarification of instructions or for routine details. Assignments should be specific, required readings should list exact references and page numbers, and the instruction sheets should be clearly labeled.

Module Title

Each module has a title which appears on the front page, at the top under the program name.

The title is designed to make the module easy to identify, and it tells in a few words what the student will be doing in completing the module.

The module developer is to write the title, using the following guidelines:

- Examine the objectives for the module and determine the skill or competency the module is designed to teach.
- The title should describe in clear and straightforward terms what the student will be doing.
- The title should be very short--about one to five (1-5) words.
- Avoid cleverness, puns, and obscure terms.
- Avoid unnecessary repetition of the program name in the module title. For example, the word "tractor" is implied in the Tractor Mechanics modules: i.e., not "Installing Tractor Ignition Points," but simply "Installing Ignition Points."
- Use the present-participle form: e.g., "Making Bite-Wing Radiographs," not "Bite-Wing Radiograph Procedure."

Examples of the Title

[BANK TELLER]

Cashing Checks

[DENTAL ASSISTANT]

Developing X-ray Film

[CHILD-CARE WORKER]

Telling Stories to Children

[CARPENTRY]

Making Miter Joints

[CASHIER-CHECKER]

Bagging the Merchandise

[MACHINE SHOP]

Reading the Vernier Caliper

The Introduction

The "Introduction" section provides the student with a frame of reference for the module. It gives the student an idea of the purpose of the module, of how it relates to what has already been learned, and of how it relates to future learning. In very concise terms, the introduction tells what the student is going to learn in the module, and why it is important for him to learn it.

The wording and tone of the introduction should attempt to allay the anxieties surrounding unfamiliar or difficult topics by assuring students that the objectives can be achieved. Within the restrictions of space, the introduction should attempt to provide motivation and arouse the student's interest in the learning experiences that are to follow. One way of doing this is to describe a useful skill the student will gain from the module.

The following are guidelines for writing the introduction:

- The introduction should be short, concise, and succinct. It must be no longer than 75 to 100 words.
- Use short sentences, with no difficult or unfamiliar terms.
- Use the second person form (e.g., "You will be learning how to thread the sewing machine.").
- If an unusual technical term appears in the module title (e.g., "Preparing the Amalgam"), define the term very briefly in the introduction.
- Resist general, trite statements of encouragement, such as "Good luck," or "You can do it!"

Examples of the Introduction

[BANK TELLER]

Many of the customers who come to your teller's window will have a check that they wish to turn into cash. Before the check can be cashed, it must be examined by the teller to be sure it is legally acceptable. When he has done this, the teller can process the check and dispense the cash. When batches of checks are presented by the customer, a somewhat more complex procedure is required. In this module you will learn how to handle these transactions.

[TRACTOR MECHANIC]

The engine ignition points are electrical contacts that open and close like a switch to send electricity to the spark plugs at just the right time. If the farm tractor engine is to start easily and operate with full power, the points must be installed carefully and adjusted very accurately. You must be able to adjust the points before you can go on with other engine tune-up operations. In this module you will learn how to clean old points, install a new set of points, and adjust the ignition gap to the maker's specifications.

Directions

The "Directions" section will be very similar for all the modules. The directions have three main functions:

1. to tell the student about any prerequisite modules or special conditions required.
2. to tell the student how to take the final test if he feels he already has the competency with which the module deals.
3. to help the student get started on the learning activities of the module.

In listing the prerequisites, list only those modules that are immediately and directly essential to the successful completion of the present task. Do not list all the modules that would normally precede it in a typical program. Most modules will have no listed prerequisites, or will have only one or two. Sometimes the module writer may want to suggest that the student review a particular module to refresh his memory on a topic.

There may be some special conditions that must be met before the student can successfully accomplish the module, such as the availability of a piece of special equipment, a live customer, a specified uninterrupted period of time, or even correct weather conditions. State any special conditions in the first sentence of the directions.

The format for the directions should follow the given examples very closely. Only a few words should be changed as appropriate (e.g., "read the three objectives below," or "read the objective below").

Examples of the Directions

[BANK TELLER]

Before you start to work on this module, be sure you have completed Module BT-12, "Using the Adding Machine," and Module BT-15, "Making Out Cash Tickets."

If you have completed these modules, read the three objectives below. If you think that you are already able to perform these tasks, read the Check-Out Activities on the back cover. Then either arrange with your instructor about doing the Check-Out Activities,

or

If you need to complete learning activities in order to be able to do the tasks, find the Learning Activities inside this module and go through them in the order in which they are listed.

[COSMETOLOGY]

In order to complete this module you will need a customer on whom to practice. You may ask a classmate or an outside adult to take the role of the customer.

Read the objective below. If you think that you are already able to perform this task, read the Check-Out Activities on the back cover. Then either arrange with your instructor about doing the Check-Out Activities,

or

If you need to complete learning activities in order to be able to do the tasks, find the Learning Activities inside this module and go through them in the order in which they are listed.

Objectives

There may be just one objective for the module, or there may be several. It is not the responsibility of the module writer to select the objectives but simply to verify that the given objectives are the correct ones for the module.

The objectives are to appear in the module in exactly the same form as they are stated in the V-TECS Catalog of Objectives and Criterion-Referenced Measures. Do not reword or reorganize them in any way. If a typographical or other error is suspected, the appropriate curriculum specialist should be consulted. Do not include the reference numbers from the V-TECS catalog.

If there are several objectives included in the module and they need to be put into a sequence, organize them on the basis of a chain of competencies; i.e., if the student needs to have accomplished one skill before he can be expected to accomplish another, place the objectives in that order. If there is more than one objective, number each one in its correct order.

Examples of Objectives

[BANK TELLER]

(1) Given a display of three checks with endorsements, examine each check and choose the one that is acceptable for cashing.

(2) Given a teller's window prepared for cashing checks and a teller's stamp, cash a single check. All items on the instructor's checklist should be performed acceptably.

(3) Given a teller's window prepared for cashing checks, a teller's stamp, and an adding machine, cash a batch of checks. All items on the instructor's checklist should be performed acceptably.

[CASHIER-CHECKER]

(1) Provided merchandise, a price list and price-marking tools and supplies, correctly price-mark all of the items so that all of the prices will agree with those on the price list and all of the marked prices can be read.

Learning Activities

In many ways the Learning Activities section is the core of an instructional module. It translates the expected goals of the written objective into learning that results in real behavioral change on the part of the student. The Learning Activities section tells the student just what he will need to do to achieve the objectives and master the necessary skills. It presents the activities in a very concise manner, and in an ordered sequence, directing the student to various specific resources, or asking him to engage in certain laboratory experiences. If the learning activities are well thought out and clearly stated, the student should be able to proceed through them with little or no management from the instructor. If the activities are carefully selected, the student will learn and will be able to perform the competencies involved in the module.

When instruction is modularized, individualized, and performance-based, the instructor's role and function change considerably. The instructor will not function very much as a lecturer, a discussion leader, or a presenter of classroom demonstrations. He or she will be more of a resource person, making learning diagnoses, giving prescriptions , providing assistance, asking questions, and making evaluations. Thus, the learning activities will not by-pass the instructor or turn the program into a kind of in-school correspondence course, but will utilize the instructor in a more efficient way in order to gain the most from his professional knowledge and expertise.

It is essential that the selected learning activities be designed to lead directly to the specified competencies of the module. They should

include everything a student needs to know or be able to do to reach the objective. It will not be assumed that the student will somehow fill in the gaps by asking around, watching somebody else, or making some good guesses. If he needs certain information, he will be told how to get it. If he needs to develop a physical skill, he will be shown the skill and be given the opportunity to practice until he has perfected his performance. If he is to produce something, he will be told what he is to produce and how to go about it.

At the same time the learning activities must not include extraneous matter and must not give students an assignment with the vague idea that somehow it will do them good. The readings should be to-the-point, the laboratory assignments should be carefully limited to what the student must be able to do, and the practice exercises should concentrate on the requisite skills. As the learning activities are devised, they will have to be constantly checked against the performance objectives to make sure they lead directly to student competence and the achievement of the objectives.

Most instructional modules in vocational education will include a knowledge component and a skills component in some form. Depending on the occupational service area and the learning strategy involved, most learning sequences will begin with experiences designed to increase awareness and provide the necessary foundational knowledge. This knowledge (or cognitive) component will include a grasp of terminology, facts, data, and other information related to the competency.

The next activity (or several activities) will present the student with the skills involved and provide opportunity to practice the skills at different levels of complexity and difficulty. The first

practice may be isolated and simple. (For example: "Practice using the hand wood-plane on a scrap piece of wood until you achieve a smooth, straight cut and a continuous chip.") Later practice may require more complex use of the skill under more demanding conditions. (For example: "Plane all six sides of a board, keeping each square with the other, and within specified dimensions.")

The final learning activities should provide experience as close to the real world and the criteria of the performance objective as possible. The balance of knowledge and skills components will depend greatly on the subject matter. The student of electronics who is learning to deal with Ohm's Law will need to learn a great deal of terminology, abstract concepts, and theory, while the computational skills involved may offer little that is new to him. When he is completing a module on soft-soldering, however, the amount of new factual knowledge may be minimal, but perfecting the skill of soldering under a variety of conditions may take a considerable amount of time and practice. The relative amount of stress to be placed on the knowledge and skills components depends on the objective of the module and must be controlled strictly.

The last learning activity listed in the module will always be:

ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITIES listed on the back cover.

Frequently instructors (and module writers) fall into a pattern of using only two or three kinds of learning activities in their instructional strategies. This is understandable because they are familiar with these few tactics, know that they usually work, and feel comfortable with them. The students, however, may well suffer from learning activities that are unsuitable for them, that lack variety of mental or physcial challenge, or that are just plain boring. Learning can be increased by varying the stimuli. In these

modules, attempt to utilize a wide variety of learning activities to suit a range of students' learning styles and personal interests.

It is very important that the number of learning activities included in any one module be limited to those essential to the student's learning of the competency. Activities thought to be enriching or included just because they might be "good experience" must be omitted. Keep the activities short so that the student can learn the material in a reasonable length of time. A module devoted to a limited skill may have only two or three learning activities. A module dealing with very complex skills or broad knowledge might have as many as eight or even ten learning activities, but this should be considered as the maximum.

SUGGESTIONS FOR LEARNING ACTIVITIES

The following section describes a number of kinds of learning activities that are suitable for use in individualized instructional modules. Some specific examples are also given. These suggestions are not meant to be all-inclusive, but are presented to stimulate the module writers' own creative thinking.

1. Readings from textbooks of short, relevant sections dealing specifically with the knowledge required to reach the objective. This may be a single reference or may be given as alternative references from different books.

2. Examination or data-gathering from standard reference books of the vocational field (e.g., Machinery Handbook, Graphic Standards, or Reference Manual for Office Personnel).

3. Completion of a section of a programmed text or other programmed material.

4. Reading of special materials available in the school library (e.g., books, encyclopedia articles, periodical articles from bound volumes, etc.).

5. Solving of practice problems in the skills component (computational problems, exercises, etc.).

6. Viewing or listening to individualized audio or audio-visual materials (e.g., slide-tapes, audiotapes, filmstrips, illustrations, models mock-ups).

7. Observing or operating models, mock-ups or dummy set-ups to gain understandings of mechanisms or operating controls (e.g., plastic mock PBX board, rotary engine, set-up of electrical circuit, practice key board).

8. Role-playing of performance in a simulated situation. Students may take the principal role of the practitioner or the participating role of the customer, the assistant, the audience, etc. These should be final learning activities.

9. Real-life performances, where the students function for short periods of time under controlled conditions in an actual work situation, or a situation very close to real (e.g., conducting a story-reading time at a child-care center, setting up equipment in a surveying team). These also should be final learning activities.

10. Observing the skilled vocational worker in a real work situation. This should be done with specific goals in mind, usually with some form of guide, observation instrument, or report form which will give structure and point to the observation period.

11. Videotaping of student performance, to be viewed and used by the student to evaluate and improve his performance.

12. Simulation experiences, where a student goes through a "dry run" of the performance with the conditions controlled and consequences minimized. "Case Studies" in which students write their reactions and responses to the given situation are also considered simulation experiences (e.g., working with dummy patient in health care; a model head in cosmetology; disassembling and assembling a non-functioning aircraft engine).

13. Small-group experiences, when students at closely related points of achievement can get together to discuss, plan, or evaluate their work (e.g., discuss results of observation, plan for role-playing sessions, evaluate the instructional value of their activities).

14. Instructor demonstration of an operation. There may be instructional situations in which the only solution is for the instructor to personally perform the operation and describe it as students observe. Usually this will need to be on an individual basis, but sometimes may be possible for small groups or even the total group.

15. Guest speakers or outside experts. These classroom experiences may be listed in an appropriate module and may be scheduled by the teacher at a time when many students are ready for the experience. Usually the nature of the topic is such that the whole group can benefit, even though they may not be at that exact point in their learning.

16. Production or construction of projects or services. These must directly contribute to the objective and, therefore, must be carefully designed and assigned, limited in scope, and require a specific amount of time (e.g., do a complete manicure on a fellow student; construct a W truss; make working drawings of a floating footing; make a skirt with zipper; decorate a cake with icing).

17. Problem-solving activities. Some objectives may require solving the problem involved in given situations. These may be relatively short experiences (e.g., prepare a luncheon menu for a particular group) or quite long-term jobs (e.g., design a vacation cottage for a family of four in a mountain setting). It is very important in problem-solving activities that the student is known to possess the requisite skills, that he has access to the information necessary to solve the problem, and that the problem not go beyond the performance objective.

18. Skills practice exercises. Some skilled operations may require that the student not only be able to perform them correctly once, but that he be able to do them smoothly and flawlessly every time. Learning activities may therefore specify practice periods in terms of time, number of repeated experiences, or quantity of production (e.g., make welds without a rod for two hours; produce ten perfect button holes, take dictation in shorthand).

19. Memorization. The performance objective may require or suggest that the student can best function if he has committed some information to memory. This is a legitimate learning activity (e.g.,memorize the table of metric measures, memorize the Gregg characters, memorize the fomula for lathe speeds, memorize a list of technical terms).

20. Collecting activities. Some performance objectives may be reached by asking students to gather and collect real objects so as to become familiar with their characteristics, the variety available, the settings in which they may be found (e.g., make a collection of metal fasteners, building materials, local lawn weeds, children's street games, newspaper classified ads).

21. Scaled-down performance. If the real performance is large in physical size, complex because of the number of participants, or consumes a quantity of expensive materials, a limited performance or a scaled-down situation may give the student a better chance of gaining confidence or success and may be more instructionally efficient and practical. (Examples of scaled-down experiences are: teach an outdoor game to two children, construct a scale model of a built-up roof construction, lay out an irrigation system on a land contour model, build a corner of a block wall.)

22. Reading of the Instruction Sheets specifically prepared for the module. These will be concise statements of very relevant information that is geared to the student's level and available from no other convenient source.

23. Performing experiments in the laboratory. Assign the student specific experiments to perform with specified equipment and processes. Have him observe the results and report or utilize them in some way.

24. Writing of technical reports, reactions to case studies, reports for class discussion, etc. This activity may be particularly valuable in the technical areas.

25. Preparing visual materials. Gather information and produce diagrams, schematic drawings, charts, graphs, topographic maps, contour maps, graphic solutions, structural drawings, styling illustrations, layouts, design sketches. Activities of this type are usually interesting to students, add variety to the learning experience, and tend to reinforce learning.

26. Planning experiences. Performance objectives may require that the student learn how to plan the job or operation. Planning may include selecting or designing the job, developing a sequence of procedures, figuring materials and costs, noting checkpoints and safety cautions, devising evaluation standards.

27. Critique or evaluation experiences. In these, the student is asked to rate or evaluate an example of a finished product or service, or to make a critical analysis of a performance of a specified skill. The object of the evaluation may be a sample product, the work of a fellow student, the student's own work, a film or videotape of a performance. The final result may be a rating sheet, written report, or oral report.

28. Cooperative student experiences. Though instruction may be individualized there are situations when two or more students may work together in a learning experience. Many occupational tasks involve teamwork, and it is proper for the learning activities to incorporate this. Activities that involve heavy lifting, cooperative production techniques, worker interaction, or that usually require a team approach in the occupation are places where cooperative student experiences are applicable.

RECOMMENDATIONS ABOUT LEARNING ACTIVITIES

- Readings must be directly related to objective--the writer should not require the reading of a whole chapter just because it would be good to know, when a page or two is all that is really necessary.

- Viewing motion picture films on an individual-student basis is usually not feasible because of the difficulties of arranging for the film, projector and viewing room. The use of overhead transparencies may still be helpful in some situations, especially if good ones are already available. The equipment is not difficult to use.

- The instructor must not be overused in the routines of learning experiences. He must be free to perform the functions of assisting, helping students overcome learning difficulties, and evaluation. (E.g., Do not use instructor in routine role-playing, for additional assignments or information, or in practice exercises.)

- Observation experiences should be directly pointed toward the performance objective and not undertaken simply in the hope that somehow the experience will increase learning. Observation time must be reasonably short. Arranging for observation must not be embarrassing or difficult for the student, or time consuming for the teacher.

- In individualized instruction, teacher demonstrations will need to be strictly limited. It is unrealistic and inefficient to expect that the teacher will be able to present elaborate demonstrations to each student individually as needed. Group demonstrations are not likely to take place at a time when all students will be ready to learn from them, except perhaps in the early stages of a course. "Mini-Demonstrations," taking just a minute or two to complete, may be a practical device.

- Every vocational teacher should be concerned with the improvement of student communication skills, but in most vocational areas the success in the program should not depend on the student's ability to read at a high level or write skillfully. Most learning activities, therefore, should not require sophisticated communication skills, and the evaluations should not be based on the student's ability to write effectively. Of course, if the program performance objectives specify a certain verbal ability, the learning activities can be expected to reflect this.

- The learning activity assignments of the module should consist of short and concise statements such as are shown in the examples. If there are learning activities that require long instructions or suggestions (for example, an observation experience), these should be fully explained in an instruction sheet that will appear in the Special Learning Materials pocket. The learning

activity assignment should simply refer to this instruction sheet by title.

E.g., READ Instruction Sheet I, OBSERVING THE CHILD-CARE WORKER IN ART ACTIVITIES.

- The learning activities statement is to begin with an action word (verb) to indicate to the student what he is to do in the activity. This action word will be printed in capital letters and underlined. Sometimes, in order to make the meaning clear, it will be necessary to capitalize and underline the first two or three words of the statement (e.g., PLAY THE ROLE ..., not PLAY the role).

Examples of Learning Activities

1 → READ Jones and Laughlin, The Bank Teller: Tasks and Procedures, pp. 81-97.

(or)

2 → VIEW the slide-tape presentation BT-17, "Cashing Checks," in the Learning Center.

(or)

3 → COMPLETE THE PROGRAM in the A.B.A. booklet, Checks, pp. 26-97.

(or)

4 ✓ CHECK YOUR KNOWLEDGE of examining checks for acceptability by taking Student Self-Check I, EXAMINING CHECKS FOR ACCEPTABILITY.

5 → READ Instruction Sheet I, PAYING CURRENCY.

(or)

6 → PLAY THE ROLE of the bank teller in dispensing currency. Ask a fellow student or your instructor to request amounts of money in specific denominations. Using a supply of currency at the teller's window, go through the transactions of dispensing the correct currency.

(or)

7 → PRACTICE processing batches of checks in the learning laboratory. Get the practice materials for Module BT-17, and use the adding machine to prove your totals.

8 ✓ ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITIES listed on the back cover.

Examples of Learning Activities

1 → REVIEW THE TERMS given in Instruction Sheet I, TERMINOLOGY OF BITE-WING RADIOLOGY.

2 → READ Anderson, Dental Radiology, pp. 27-28 and pp. 40-45. Or READ Simmons, Clinical Dental Assisting, pp. 71-77.

3 ✓ CHECK YOUR KNOWLEDGE of bite-wing radiology by completing Student Self-Check I, BITE-WING RADIOLOGY.

4 → VIEW the slide-tape presentation D.D.M. 820, "Oral Radiology: Interorals Techniques," in the Learning Center.

5 → EXAMINE AND IDENTIFY accessories needed to take a bite-wing radiograph. Read Instruction Sheet IV, ACCESSORIES FOR BITE-WING RADIOLOGY.

6 → STUDY Instruction Sheet V, POSITIONING THE PATIENT AND PLACING THE INTERORAL BITE-WING FILM IN THE ORAL CAVITY.

7 → PRACTICE positioning the patient and placing bite-wing film. Use the mannequin in the skills laboratory.

8 → PRACTICE by using a short-cone 8" target film distance and set the proper MAS and KU on the x-ray machine in accordance with the exposure chart.

9 → DEMONSTRATE to your instructor specific safety rules to be observed in protecting the patient and yourself.

10 ✓ ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITIES on the back cover.

Student Self-Check

The "Student Self-Check" is a device included in the module to allow the student to check his or her own progress toward final mastery of the competency. It is primarily used to check on the cognitive or knowledge phase of learning that usually forms the first of the learning activities. Because it is a self-check, designed to help students improve their learning, it is not to be utilized by the instructor for purposes of grading. In the sequence of learning activities, the self-check will typically be placed right after the readings or other cognitive experiences.

The student self-check may take a wide variety of forms, depending on the subject matter and approach. These forms may include, among others:

- questions that require a short essay-type response
- review items in a textbook to which the student is referred
- a series of objective test items
- diagrams, charts, sequence lists, etc., that require completion
- paper-and-pencil problems to solve
- test items presented orally on tape

Correct responses to the self-check items should be supplied by the module writer. The student needs to be given knowledge of results to reinforce his correct responses and to provide an opportunity to learn the material missed. For essay-type items, model answers should be given; other items require correct solutions, answers, or completed devices. The correct responses can be given at the bottom of the page (perhaps upside down to discourage peeking), on the back of the

self-check sheet, or on a separate sheet. Since modules are planned to be largely self-instructional, the instructor should not be involved either in administering the self-check or furnishing the responses. Of course, any student who has questions or difficulty with the self-check has the option of talking it over with the instructor.

Example of Student Self-Check

Student Self-Check I
SETTING THE LATHE FOR SPEEDS AND FEEDS

Write a brief definition of the following terms:

1. CUTTING SPEED _____

_____

2. FEED _____

_____

What do the following abbreviations stand for in lathe terminology?

3. cs _____

4. fpm _____

5. D _____

Use the correct formula given in Johnson, Machine Shop, p. 130, to solve the following problems:

6. What is the cutting speed in feet per minute of a piece of carbon steel 1 1/2" in diameter, revolving at 150 rpm? _____

7. Find the cutting speed of a piece of aluminum 7/8" in diameter turned on a lathe at 180 rpm. _____

8. Find the rpm at which a piece of tool steel 3/4 D should be turned. _____

ANSWERS

1. The distance the workpiece moves past the cutter in one minute as measured on the circumference.
2. The distance the tool travels along the lathe for each revolution of the workpiece.
3. Cutting speed in feet per minute.
4. Feet per minute.
5. Diameter of the workpiece in inches.
6. 59 fpm.
7. 41 1/4 fpm.
8. 265 rpm.

Instruction Sheets

The inner pockets of the module are designed to hold instructional material needed by the student to complete the learning activities and to achieve the performance objective of the module. Most of the material contained in the pockets will be in the form of instruction sheets. The term "Instruction Sheet" is a general term for all kinds of typewritten, printed, mimeographed, duplicated, or blueprinted instructional material to be used by vocational students in the laboratory or classroom. An instruction sheet may be a single sheet or several pages and may be prepared by the module writer, derived from school sources, or obtained from commercial publishers or industrial sources However, copyrighted materials may be used only with the publisher's permission.

Instruction sheets in the module are basically completely prepared mini-lessons which are intended to aid self-instruction, and which include all necessary information and directions. There are a number of types of instruction sheets that may be used in a module, each with its own purpose and characteristics. Some of the most suitable types are:

- Job sheet, or project sheet. This form of instruction sheet is designed to give instructions and specifications for doing a complete piece of work or a job. It may include detailed written directions, or a working drawing, or both.
- Operation sheet. This is a sheet giving instruction in a single operation or process that requires some special knowledge or skill of the student. There may be several operations involved in any given job.
- Information sheet. This is provided to furnish students with special information--special because it is very new, obscure, difficult to obtain, or necessary to have close at hand.
- Assignment sheet. This may be a sheet of problems to be solved, questions to be answered, observations to be made, or tests to be performed.

- Work sheet. This is a printed form to be filled in by the student in the process of gathering data, performing a job, or solving problems.

It is helpful for the module writer to develop the various types of instruction sheets listed above in terms of the function and form. It is not necessary, however, for students to be concerned as to the classification of the instruction sheet that they are asked to read. The sheet heading, therefore, will simply indicate that it is Instruction Sheet I (or a consecutive number), along with the specific title of the sheet (for example, GREETING CUSTOMERS).

All instruction sheets, of whatever type, require careful thought and preparation. All facts, data, and specifications should be thoroughly checked for accuracy. Spelling, grammar, and technical terminology must be beyond reproach. Modern textbooks in the occupational service areas are usually filled with clearly written and well illustrated information and instruction, so it is not necessary for the module writer to duplicate this material. The module learning activities should simply refer the student to the appropriate reference.

Instruction sheets should be developed for the module if:

- The information is new or unusual, or for some other reason textbook instruction is not available.
- Students need to refer to instructions frequently in order to complete the laboratory work.
- The available readings are scattered, written at the wrong level, or are filled with much extraneous material.

Where instruction sheets are required, the following general guidelines apply:

- Use language that is straightforward and easily understood by the students for whom the sheet is intended. Define new terms.
- Supplement the words with sketches, illustrations, and diagrams for greater clarity.

- Give specific directions that are clear and concise, and that minimize the need for explanation by the instructor.

- Limit each instruction sheet to one piece of paper if possible, but avoid crowding the page.

- Use a uniform format for all instruction sheets so that students can easily find the desired information. Space the various divisions of the sheet (such as title, purpose, illustrations, and text) to produce an easily read and attractive page.

- Be consistent in terminology to avoid confusion.

- Include only relevant material that is designed to help the student achieve the objective. Use discretion to avoid filling the sheet with unnecessary information, no matter how fascinating it may seem.

- Instruction sheets for the early modules of a program may need to be very structured and specific. Exact procedures, tools and materials may be given in detail so that nothing is left to chance. In the later modules, the instruction sheets may be less fully detailed to allow the students to solve some of the problems involved.

- Do not copy published and copyrighted materials. Such materials can be used only as a basis for writing original instruction sheets.

- All instruction sheets must be suitable for duplication on 8 1/2" x 11" paper.

- Instruction sheets will be produced in many forms according to their purposes. In the case of the job or project sheet, however, it will probably aid the student if the same format is used throughout all the modules of the program. A suggested format for such a sheet follows.

Sample Format for Job or Project Type of Instruction Sheet

[*Material in italics describes the content to be included*]

Instruction Sheet

JOB TITLE: [*Name the job in a word or two.*]

REFERENCE: [*Reference to textbook instructions, illustrations, specification sheets, manuals, or other materials needed to complete this job.*]

LABORATORY WORK: [*Instructions for completing the skills phase of the job. Including as appropriate:*

--*Materials required*
--*Tools and equipment required*
--*Illustration or drawings of completed job*
--*Step-by-step procedures*
--*Dimensions and/or specifications*
--*Safety precautions or special requirements*]

CHECKPOINTS: [*Note specific places in the work when the instructor should be called in to check on the progress of the job.*]

EVALUATION: [*Describe the procedures for the instructor's evaluation of the job.*]

Instruction Sheet II

PAYING CURRENCY

Handling currency is one of the most important functions you perform. Skill in handling currency can be acquired only through practice and application. In paying out currency, the following points should always be remembered:

1. Save time by asking the customer in which denominations he prefers his change.

2. Get the amount clearly in your mind. When paying out change from a split check, be sure to verify the change count with your adding machine, and check with the tape once more before handing out the change to the customer.

3. Count out large bills first.

4. Always perform two cash counts:

   a. One as the currency is removed from the drawer.
   b. The second as the cash is paid out to the customer.

5. Pick up each bill with the forefinger and thumb, roll it to separate it from the remaining bills, and place it in the other hand with the balance of bills to be paid out.

6. Don't count the currency faster than the customer can count; he will often recount and hold up the line while doing so.

7. If the customer changes his mind about the denomination, the request should be complied with cheerfully.

Example of Instruction Sheet

Instruction Sheet II

VENEER GRAFT

OPERATION: Making a veneer graft on tree stock

PURPOSE: The veneer graft can be used successfully to propagate fruit trees on stock 1 year old or older.

CONDITIONS: Scions should be terminal, 3 to 4 inches long, and 3/8 to 1/2 inch in diameter.
Buds should be swollen, but not sprung.
A large terminal bud on scion is preferred.

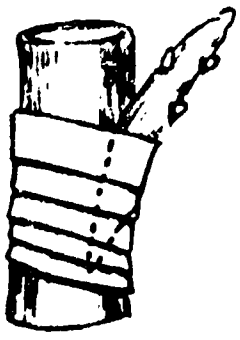
TOOLS AND MATERIALS: .0035" vinyl film strips
Sharp knife

PROCEDURE:

1. Make a slanting cut about 2" long in side of stock so that at the bottom the cut is 1/16" to 1/8" in depth.
2. Make an angular cut at the base of the large cut so as to remove the piece of bark and wood. (Fig. A)
3. From the scion, cut a piece of bark and wood to correspond with the cut in the stock. (Fig. B)
4. Fit the little tongue on the base of the scion into the notch at the lower end of the cut on the stock.
5. Wrap the graft snugly with a strip of vinyl film, leaving the terminal bud exposed. (Fig. C) The graft should take in 3 or 4 weeks.

A. STOCK

B. SCION



C. SCION IN PLACE

Check-Out Activities

The check-out activities are really items for a final test of the competencies the student is expected to learn in the module. This section is sometimes referred to as the "final assessment procedure," or "final evaluation." Before the student can be certified as having completed the module, he or she must have gone through the check-out activities and have accomplished the required tasks at the specified level of performance. The final assessment is always done by the instructor.

In some cases, students who have had previous experience in the occupation, or who have acquired the skill in general life experience, may be able to go through the check-out activities without having done the learning activities of the module. The check-out activities and the final checklist must be written and administered so that the student who has acquired the requisite skill outside the classroom will in no way be at a disadvantage in the evaluation procedures.

There are two main parts of the check-out activities as written in the module: (1) the statement of directions, and (2) the list of activities themselves. The directions will consist of a very short statement telling the student how he is to go through the check-out activities and what instrument or procedure the instructor will use to rate his performance. In all cases the student should clearly understand <u>how</u> he will be evaluated and <u>what</u> evaluation criteria will be used--there should be no obscurity.

The check-out activities themselves will be taken directly from the V-TECS catalogs and in fact will be the <u>criterion-referenced measures</u> for

the given objectives. There should be no change in wording or organization of the measures. The check-out activities are to be presented on the back page of the module in the same order or sequence as the objectives are presented on the front page.

Examples of Check-Out Activities

[BANK TELLER]

The statements below explain the activities you must be able to complete in order to finish this module. As you go through each activity, your instructor will rate your performance using the Instructor's Final Checklist, EXAMINING AND CASHING CHECKS.

- ✓ Your instructor will provide a display of three checks with endorsements. Examine the face and endorsement of each check. Place an "X" across the check that is acceptable for cashing.
- ✓ Go to the teller's window. Remove the check from the container labeled "Customer" and cash the check.
- ✓ Go to the teller's window. Remove the checks from the container labeled "Customer" and cash the batch of checks.

[CHILD-CARE WORKER]

The statement below explains the activity you must be able to complete in order to finish this module. After you go through the activity your instructor will rate your performance using the Instructor's Final Checklist, PLANNING SPECIAL ACTIVITIES.

- ✓ The teacher will provide you with a case situation. Plan a field trip, the use of a resource person, a holiday celebration and a party for the situation described.

Instructor's Final Checklist

An "Instructor's Final Checklist" will be needed in almost all modules. It will be derived from the V-TECS catalog or developed specifically for the module by the module writer. The purpose of the checklist is to provide the instructor with an instrument to determine whether or not the student has mastered the competencies taught in the module. By listing a series of elements to be rated by the instructor, the checklist makes the evaluation much more objective and ensures that the instructor rates all the important elements in the competence. This kind of carefully controlled evaluation is absolutely essential to the validity of competency-based education.

When the student thinks he is prepared, he asks the instructor to examine his work or observe his actual performance of the task. The instructor then rates the performance or the product according to the criteria stated on the checklist. A copy of the checklist will appear in the module, so the student will be in no doubt as to what he is expected to be able to do.

The checklist may be designed to rate the performance of the student as he demonstrates competence in performing an operation, a process, or a behavior (e.g., shutting down a gas-welding outfit; teaching a song to children; dealing with a customer's complaint).

The checklist may evaluate the final product produced by the student which indicates his competence in the required task (e.g., a specified floral arrangement; a spray-painted auto body; a television set with correct color convergence).

The checklist may assess a combination of both process and product where both are important. This evaluation is necessary to determine that the student can not only complete the task successfully, but can do it correctly every time, or within a specified period of time. The evaluation may also show whether the student can complete the task smoothly and easily, or whether he can use certain accepted procedures (e.g., replace a clutch within flat-rate time; perform a hair frosting while keeping the customer comfortable; make a dental x-ray without exposing oneself to radiation).

The items on the checklist must not be selected in an arbitrary manner or from a personal viewpoint as to what is important for the student to know. The checklist is to be derived from the objectives in the V-TECS catalog. Many of the objectives in the catalog already have evaluation checklists developed for them, and these can be readily translated into the accepted module format.

Checklists can also be derived from the Performance Guide of the V-TECS catalog. In doing this, each item in the performance guide for the particular objective should be reviewed. The items that relate directly and importantly to the performance objective should be reworded for inclusion in the evaluation checklist. Some items in the Performance Guide can be combined to make one point of evaluation.

The following guidelines should be used in developing the checklist:

- Indicate the module number in the upper-right corner.
- The title of the checklist is exactly the same as the title of the module.
- The directions should be worded the same way on all checklists--with the exception of the first sentence which describes the student performance.

- Whenever possible, avoid repetition by using an introductory phase ending in a colon, followed by a list of performance elements.

- All the items should be stated in the past tense (e.g., "The student adjusted the shut-off valve").

- The checklist has a column for a rating of "Partially Accomplished." This rating is not acceptable for proving final competence, but it can be used as a basis for student/teacher discussion.

- The column marked "Not Applicable" is there to be used when circumstances do not permit the instructor to rate the student (e.g., equipment not available; the item does not fit the program; etc.)

- Each checklist is to have a statement of the performance level required of the student. The "Performance Level" statement should be reproduced exactly as shown in the example of the checklist that follows, except in cases where the V-TECS catalog specifies a lower level of acceptable performance.

- The checklist must be designed to fit a standard 8 1/2" x 11" sheet.

- Keep the checklist within a reasonable length--one page if possible, two if necessary. Remember that the instructor is going to be required to rate every item. Select items that are crucial to the performance of the competence and/or combine items.

Example of Instructor's Final Checklist

Instructor's Final Checklist

EXAMINING AND CASHING CHECKS

Check the student's performance in the following elements of examining and cashing checks.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished, or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. The student examined checks for acceptability and identified all checks that were not acceptable.	[ ]	[ ]	[ ]	[ ]
2. In the process of cashing a single check, the student:				
a. examined negotiability points of the check.	[ ]	[ ]	[ ]	[ ]
b. prepared cash-out ticket.	[ ]	[ ]	[ ]	[ ]
c. dispensed money	[ ]	[ ]	[ ]	[ ]
d. retained correct information for the records. . . .	[ ]	[ ]	[ ]	[ ]
3. In the process of cashing a batch of checks, the student:				
a. examined negotiability points of each check	[ ]	[ ]	[ ]	[ ]
b. proved the total of the batch of checks	[ ]	[ ]	[ ]	[ ]
c. prepared the cash ticket.	[ ]	[ ]	[ ]	[ ]
d. dispensed cash to the customer.	[ ]	[ ]	[ ]	[ ]
e. processed the checks.	[ ]	[ ]	[ ]	[ ]
f. retained correct information for the records. . . .	[ ]	[ ]	[ ]	[ ]

Example of Instructor's Final Checklist

Instructor's Final Checklist
ORGANIZING AND GUIDING STORY TIME

Check the student's performance in the following elements of organizing and guiding story time.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished, or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
In organizing and guiding story time, the student:				
1. Selected an activity appropriate to the interests and needs of the group.	[ ]	[ ]	[ ]	[ ]
2. Prepared materials required for the activity.	[ ]	[ ]	[ ]	[ ]
3. Assembled needed materials, supplies, and equipment	[ ]	[ ]	[ ]	[ ]
4. Used techniques to discourage loudness during the activity.	[ ]	[ ]	[ ]	[ ]
5. Aided and encouraged the children in developing word concepts	[ ]	[ ]	[ ]	[ ]
6. Used techniques designed to get the participation of each child in the activity	[ ]	[ ]	[ ]	[ ]
7. Used a variety of stories, including the familiar and unfamiliar.	[ ]	[ ]	[ ]	[ ]
8. Practiced positive disciplinary techniques.	[ ]	[ ]	[ ]	[ ]
9. Completed a self-evaluation of performance in guiding story time.	[ ]	[ ]	[ ]	[ ]

Instructor's Final Checklist

STRAIGHT-TURNING PROJECT I

Check the student's performance in the following elements of straight-turning on an engine lathe.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished, or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
The straight-turning project completed by the student exhibited the following characteristics:				
1. The length of the piece was to specified dimensions, within ± 1/32"	[ ]	[ ]	[ ]	[ ]
2. Diameter of cylindrical section was to specified dimension, within ± .001" over its entire length	[ ]	[ ]	[ ]	[ ]
3. The shoulder was clean, sharp, and at 90°	[ ]	[ ]	[ ]	[ ]
4. Rounded end had 1/16" radius, with smooth and uniform curvature	[ ]	[ ]	[ ]	[ ]
5. Surface finish was smooth, with no noticable defects or tool marks	[ ]	[ ]	[ ]	[ ]
6. All sharp edges were deburred	[ ]	[ ]	[ ]	[ ]

Instructional Illustrations

Illustrations in a variety of forms are extremely valuable in developing effective instructional modules. Many times, illustrations can explain, instruct, and clarify in a far more efficient manner than can words. For students who have limited reading abilities, a good drawing can make the difference between learning or not learning the competency of the module. Artists are available to assist module writers in developing and completing instructional illustrations. Available time and financial resources, however, impose some important limitations on the use of illustrations.

All of the illustrations used in the module must have a strictly instructional purpose. Each drawing, diagram, or sketch must be planned to teach a specific concept or transmit some well-defined information that cannot be done as well in any other way. It will not be possible to use illustrations simply for aesthetic reasons, or to entertain the students, or to fill space. Illustrations will be limited to the instruction sheets and student self-checks, which will be placed in the inner pocket of the module.

Illustrations may take the following forms:

Diagrams	Charts & Graphs
Schematic Drawings	Plan Drawings
Enlarged Details	Simplified Drawings

Original illustrations should not be specially made when they are already available from other sources. If a good drawing is available in a standard textbook, the module writer should refer the student to the page in the text where it appears. Writers and artists should examine the files of existing drawings to determine whether useable ones already exist, thus saving a great deal of the artist's time. However, under no

circumstances should copyrighted materials be used in the modules, nor should photocopies be made for reproduction.

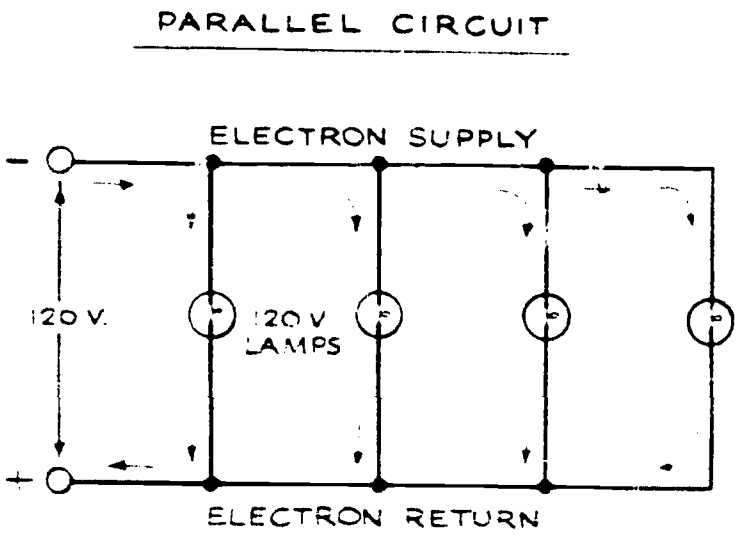
The information to be included in the drawing, and the form the drawing should take, are the responsibilities of the module writer. The writer should provide the artist with all the material, information and technical data that is necessary to complete the work. It is not the responsibility of the artist to do research on the topic, though he may have ideas and suggestions on how to make the drawing best convey the message.

GENERAL GUIDELINES FOR ILLUSTRATIONS

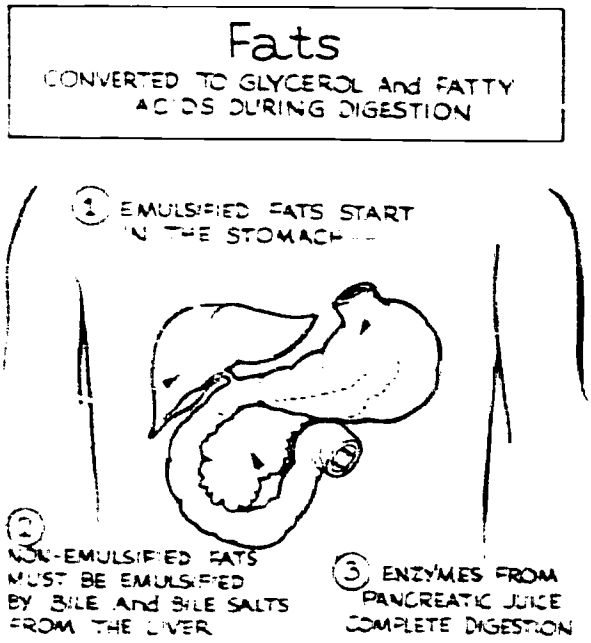
- Plan to use line drawings with simple, bold lines. Photographs can be used, but slides can not be reproduced.
- Avoid the necessity for the use of shading techniques.
- Make the drawings simple and stylized rather than heavily detailed.
- Concentrate on one concept or idea in the drawing. Focus on what is essential and eliminate the nonessential.
- Plan to use few (if any) drawings of human figures, hands, or other difficult material.
- Artists will letter drawings using professional freehand style, typewriter, or rub-off and LeRoy lettering.
- Lettering size: 1/8" or larger will be standard for drawings, 3/16" or larger for projected material.
- The original drawings will be made in ink for purposes of reproduction.
- Captions for drawings will be furnished by module writers. Use short, descriptive phrases, with correct technical terms and spelling.
- Artists will use templates and other time-saving devices whenever possible.
- Finished drawings must fit 8 1/2" x 11" format. Both vertical and horizontal drawings should have 1 1/2" top margins and 1" side and bottom margins. Maximum size for a drawn image should be 6 1/2" x 8 1/2".

Examples of Illustrations

[ELECTRICITY]



[HEALTH OCCUPATIONS]



Instructional Media

Audio and visual instructional materials can make a more important contribution to individualized instruction than to traditional education methods. These kinds of materials augment the teacher's function by providing another path to learning--a way that may be best suited to many students' abilities and learning styles. The variety media presentations bring to learning activities benefits all students by maintaining interest, stimulating thought, and clarifying ideas. Carefully selected media can provide a means of transmitting information that is often essential to communication. There are many educational situations when a photograph or a sound recording is indispensible.

Of the great variety and combinations of media now available, the competency-based education project will standardize a few basic types. The following are the types that are most suitable for use in individualized and modularized instruction and at the same time come within the resource limits of the project:

- 2 x 2 color slides sets (either 35mm or 127 size film) produced by the CDC or from commercial sources
- Cassette audiotapes, CDC produced
- Slide-tape presentations in which the slide is automatically synchronized with the sound on the cassette tape
- Filmstrips from commercial sources

It should be noted that for various reasons, several common types of media will not be used. These include videotapes, 8mm films, single-concept loop films, and overhead transparencies. Rented or loaned 16mm films cannot easily be incorporated into modularized programs; so their use will be limited to supplemental or enriching experiences to be scheduled

for large group instruction at the discretion of the classroom teacher. Films cannot be required as integral learning activities of the modules. If module writers decide to produce their own media for the modules they develop, they will need to use one of the accepted types.

Module writers will need to decide whether the module requires the use of some form of media to aid the student in reaching the performance objective. Among the reasons for selecting a media strategy in place of other forms of instruction are:

- Available readings are inappropriate or inadequate.
- The students are likely to have difficulty in comprehending a written description.
- A special sequence of illustration is essential.
- The performance objectives require information to be presented in pictorial or auditory form.
- Color is essential to the understanding of the topic.
- A change of stimulus is needed to maintain interest and increase learning.

If any form of media presentation is required, the module writer will need to plan the material carefully. The sequence of photographs should be organized for the desired instructional effect by planning a story board. Narrative, either written or tape recorded, that is to accompany the photos should be planned along with the pictures and written down. It will be necessary to check to be sure that the objects or scenes to be photographed will actually be available when required. As the plans develop, the module writer should consult the project's media director for suggestions, ideas, and for final approval of the proposed presentation.

Some module writers will be able to develop their own media, either in the form of slides or sound recordings. The same standards of type size, quality, and development process will apply as with project-produced materials. The project media specialists will provide as much help and cooperation as possible.

Cassette tape recordings can serve several distinct and important purposes in instructional modules. To aid students who have reading difficulties, audiotape recordings of necessary readings can be made by the classroom teacher or the module developer. Tape recordings can be made to accompany slides as descriptive or explanatory material, and tape recordings can be coordinated with illustrations or text in the instruction sheets. Audio recordings may be helpful in teaching students to identify sounds related to occupational operations, or they may be used to teach students correct pronunciation of technical terms. Recordings may be taken right to the work station to "talk the students through" an operation.

It is important to remember that all of the media materials to be developed for modular instruction must be for individual student use rather than for the teacher's use in group instruction. Slide-tape presentations and tape recordings, therefore, are to be self-instructional and easily available to students for use at any time they are ready for them. In the Learning Activities section of the module an appropriate reference will be made to the media in its proper sequence. Each piece of media will bear a title and the number of the module to which it belongs. A typical learning activity reference might be:

LISTEN to the cassette tape for module AS-21, "Checking Freon Charge," while looking at the diagrams in Instruction Sheet II.

GENERAL GUIDELINES FOR MEDIA MATERIALS

- Slides and other media productions must be directly aimed at helping students achieve the performance objectives of the module. They should not be used for entertainment or general enrichment.

- Media productions should not be used when paper reproductions in the form of instruction sheets would be instructionally superior (e.g., lists of terms to be memorized, diagrams to be studies and referred to).

- The number of slides and slide-tape presentations that can be produced within the module development project is strictly limited. The topics to be produced will need to be selected with care in order to gain the greatest effect within available resources.

- Module writers should review commercial catalogs of media materials to locate material available for purchase. It is important that the commercial product is directly concerned with the module topic.

- Care must be taken to avoid duplicating copyrighted materials. If in doubt, don't use them.

- When slides are to be made, use simple, uncluttered set-ups of readily available equipment and facilities.

- Scenes to be photographed must be examined to be sure they show good examples of safety and/or sanitation. (E.g., Be sure students are wearing safety glasses, and that equipment is shown in clean and safe condition.)

- If possible, use colorful cardboard arrows, spots, or captions in the picture to aid students in identifying the important elements of the scene.

- Whenever possible, use close-ups to be sure that students can see the details, even on a very small viewing screen.

- If students or other persons are to be included in the photo, make sure they are appropriately dressed and groomed.

- Ethnic and minority groups and women appearing in illustrations must be depicted as responsible and dignified persons. The picture must not appear derogatory or degrading.

- Minority groups and women must be shown in representative numbers in appropriate situations.

PROCEDURES FOR THE PRODUCTION OF SLIDE-TAPE PRESENTATIONS

Module writers who need the services of a media specialist to help prepare slide-tape presentations must do the preliminary planning and preparation before the photographer arrives at the production site. In order to ensure efficient production and an effective final presentation, follow these procedures:

1. Review your instructional material carefully and decide which areas will require supporting media or illustrations.

2. Select the media form most appropriate for the instructional needs. Avoid elaborate media when a simple instruction sheet will do the job.

3. If you decide to use color slides, your first step is to plan a set of storycards. These are index cards for planning and controlling the production of the slides and audiotape. Write your story ideas on the bottom of the card (one per card). In the upper left corner of the card draw a simple sketch of the proposed photograph.

4. Assemble your storycards and begin to put them in proper sequence. Plan a beginning and an ending and let your story (the instructional content) flow in an interesting and logical order. Place the cards on a large table or wall so that you see at a glance if it is complete, consistent, and properly sequenced. Rearrange, add or delete storycards to refine the effect.

5. After the instructional content is planned and sequenced, develop the script and refine the photo ideas.

6. Submit your storycards to your co-director for assistance and approval before proceeding further.

7. Prepare titles and art work if possible. If you are unable to do this, write a complete description of needed art work for others to do.

8. Select and prepare the photo locations. The site must be clean, orderly, and in the best safety conditions.

9. Prepare a definite time schedule so that the photographer can move from one scene to another without delay. This is important.

10. Arrange for any "actors," such as students or workers, to be at the scene at the required time.

11. Be present and ready when the photographer arrives. Plan to complete all photographic work during this one session because he may not be able to return.

Module Evaluation

One supremely critical factor in the success of the competency-based education project is that of the quality of the final product itself--the module. Quality, in this sense, is not simply a matter of a well constructed device, free of typographical errors and containing technically correct information. It is a module that is capable of facilitating learning and changing student behavior.

To achieve and maintain the production of instructionally effective modules a process of continual evaluation will need to be utilized. Module writers will review their own work, compare it to exemplary models, and evaluate it by utilizing objective criteria. Further review, critique, and evaluation will be undertaken by the project co-directors, editor, and project director. It is highly desirable that open communication be maintained among members of the project team in order to identify any deficiencies and correct any misapprehensions.

In order to make the module review as complete and objective as possible, a module assessment checklist has been developed. This checklist includes evaluative criteria designed to focus on the instructional adequacy of the module and to keep it consistent with the performance objectives and the instructional setting in which it will be used. While each of the elements can be given a yes or no response, it is the reason behind each response that is most important.

The module assessment checklist may be used by the module writer as a self-check instrument. The checklist will be used by the co-directors, editor, and project director to evaluate modules as they are submitted. A sample copy of the checklist follows.

MODULE ASSESSMENT
CHECKLIST

MODULE NO. _____ MODULE TITLE: _____

ELEMENTS	YES	NO	?	COMMENTS
1. The introduction:				1.
a. describes what the student will learn.				a.
b. tells the student why the competency is needed.				b.
2. The directions are correct and explicit.				2.
3. The objectives are correctly stated.				3.
4. The learning activities:				4.
a. are consistent with the objectives.				a.
b. provide sufficient opportunity for the student to learn.				b.
c. are practicable and feasible.				c.
d. are appropriate to the student level.				d.
e. are clearly and succinctly stated.				e.
f. include a variety of learning modes.				f.
g. are limited to the necessary knowledge and skills.				g.
h. are free from harmful side effects.				h.
i. are largely self-instructional.				i.
j. provide student reinforcement.				j.
k. provide practice of skills in controlled settings.				k.
l. provide simulated or real-world tryout of competency.				l.
m. minimize the hazards of failure.				m.

ELEMENTS	YES	NO	?	COMMENTS
5. Student self-checks:				5.
a. are directly related to the objective.				a.
b. cover the required knowledge.				b.
c. provide the student with feedback.				c.
6. The instruction sheets:				6.
a. are clearly and correctly titled.				a.
b. are written at the student's level.				b.
c. provide the essential information.				c.
d. include appropriate instructional illustrations.				d.
e. are adequate in scope and depth.				e.
7. The instructor's final checklist:				7.
a. is in correct format.				a.
b. measures student achievement of the module objectives.				b.
c. is limited to the competencies stated in the objectives.				c.
d. states the desired performances in unambiguous terms.				d.
e. is based on observable student performance or on the product of performance.				e.