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ABSTRACT

One of five modules in the curriculum development series of the 16-module series designed to train vocational education curriculum specialists, this module is intended for use in classes or individual study arrangements at the preservice or inservice level by students with varying amounts of experience in vocational education. (These modules are revised versions of earlier study guides--see note.) Introductory materials include an overview, instructions to the learner, detailed list of behavioral goals and objectives, and resources needed to complete learning activities. The module is divided into two sections, each based on one of the goals. Several instructional strategies are described in the first section. The second section examines criterion-referenced tests designed to assess students' accomplishments of the instructional objectives of a course. Each section follows a standard format: text, individual study activities, discussion questions, and group activities. A summary of the module follows. Appendixes include suggested responses to the study activities, a self-check, responses to the self-check, and recommended references. (YLB)

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VOCATIONAL EDUCATION CURRICULUM SPECIALIST

SELECTING INSTRUCTIONAL STRATEGIES AND ASSESSING STUDENT ACHIEVEMENT

Module 9

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**SELECTING INSTRUCTIONAL STRATEGIES
AND ASSESSING STUDENT ACHIEVEMENT**

Module 9

Judith A. Appleby

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• INTRODUCTION

Introduction

The purpose of this module is to provide the future curriculum specialist with key knowledge and skills required in the curriculum design and development process: selecting instructional strategies appropriate for assisting students in achieving instructional objectives and developing test items to assess student achievement of instructional objectives.

There are several reasons why a curriculum specialist will need to know about instructional strategies. The curriculum specialist is likely to develop instructional materials and needs a repertoire of strategies for the learning activities in such materials. The curriculum specialist will also function as a teacher educator in conducting workshops and staff development seminars. He or she will therefore use instructional strategies to share information with other vocational educators.

This module assumes that you have studied the modules in this series that deal with conducting needs assessments and using task analyses to formulate goals and instructional objectives.

Overview

The first goal of this module describes several instructional strategies. To attain any instructional objective, more than one instructional strategy may be used. No one instructional strategy can guarantee student or teacher mastery of a given objective. For these reasons, the curriculum specialist is encouraged to identify instructional alternatives rather than the instructional approach.

Goal 2 of this module examines criterion-referenced tests designed to assess students' accomplishment of the instructional objectives of a course. Although the traditional form of testing in vocational education has been norm-referenced, in many situations a criterion-referenced test will be the most appropriate measure of whether an instructional objective has been achieved.

Instructions to the Learner

The Self-Check items and possible responses to them are found in the appendices. These questions have two purposes. First, before you begin work on the module, you may use them to check quickly whether you have already learned the information

in previous classes or readings. In some instances, with the consent of your instructor, you might decide to skip a whole module or parts of one. The second purpose of the Self-Check is to help you review the content of modules you have studied in order to assess whether you have achieved the module's goals and objectives.

You can also use the list of goals and objectives that follows to determine whether the module content is new to you and requires in-depth study, or whether the module can serve as a brief review before you continue to the next module.

Goals and Objectives

Goal 1: Identify the characteristics of various instructional strategies.

Objective 1.1: Identify the advantages and disadvantages of the lecture method, and communication skills appropriate for effective lecturing.

Objective 1.2: Describe a variety of techniques appropriate for small group discussion.

Objective 1.3: Identify the advantages, disadvantages, and basic techniques of the demonstration method.

Objective 1.4: Explain the unique features of the laboratory method.

Objective 1.5: Describe a variety of questioning techniques.

Objective 1.6: Explain the unique features of the inquiry method.

Objective 1.7: Identify the characteristics of simulation, games, and roleplaying, and describe how they can be applied in vocational education.

Objective 1.8: Describe individualized instructional techniques.

Objective 1.9: Identify the various types, characteristics, and purposes of field experiences.

Objective 1.10: Describe independent study techniques.

Objective 1.11: Identify the major considerations in selecting an instructional strategy.

Goal 2: Develop an evaluation plan for assessing student achievement of instructional objectives.

Objective 2.1: Describe the concept of criterion-referenced measurement.

Objective 2.2: Identify approaches/techniques for assessing student achievement of instructional objectives in the three domains of learning.

Objective 2.3: Develop an evaluation plan for assessing student achievement of the instructional objectives for a given unit of instruction.

Resources

In order to complete the learning activities in this module, you will need information contained in the following publication:

Mager, R. F., & Beach, K. M., Jr. Developing vocational instruction. Belmont, CA: Fearon Publishers, 1967.

GOAL 1: Identify the characteristics of various instructional strategies.

Curriculum Development and Instructional Strategies

The selection and implementation of instructional strategies are integral aspects of curriculum design and development. Together with other variables, such as subject content and teacher behavior, strategies are part of the process by which students achieve specified goals and objectives.

Instructional Strategies

The ten strategies discussed here are related to, and representative of, a wide variety of the approaches applicable for vocational education classes. They do not represent all possible instructional strategies. Audiovisual techniques and other media applications were not included because these are techniques that can augment any of the other strategies. The selected strategies discussed below include lecture, discussion, demonstration, laboratory, questioning, inquiry, simulation/games, individualized instruction, independent study, and field experience.

The lecture method. The lecture is probably the most severely criticized and misused form of communication in education. It is also used more frequently than any other instructional strategy. Despite frequent condemnation of the lecture as an instructional strategy, there are some learning situations for which it is appropriate. Some of the evidence in favor of lectures is as follows:

- Some students learn more readily by listening than by reading.
- It may be easier for an instructor to coordinate lectures than discussions.
- Lectures are economical in regard to learner time. The presenter can synthesize a great amount of material into a lesson.

- Lectures are economical in terms of teacher time. They enable competent instructors to reach more students.
- A lecturer can provide up-to-date information. The "explosion of knowledge" seriously limits the amount of current information that can be transmitted through textbooks.

Here are some basic communication skills that can help to make lectures more effective.

- Encourage student verbal participation--both during and after the lecture. The basic premise of this principle is that teacher talk dominates too much classroom time. Effective teacher behavior, even during a lecture, entails some interaction. Telling is not teaching. This does not mean that a totally teacher-dominated lecture is never appropriate in an educational setting. It does mean that the amount of student learning is generally negatively correlated with the amount of teacher talk. A major aim for all teachers should be the fostering of a classroom environment conducive to student verbal involvement.

How can teachers help students increase their levels of verbal communication during and after the lecture? They can attempt to know their students and help them to know each other. The teacher can communicate to each student, both verbally and non-verbally, that "I want you to respond, and I will respect you regardless of whether you answer in ways that I consider 'correct' or 'incorrect.'" This type of behavior requires the teacher to allay, as much as possible, student fears of ridicule or failure.

- Use positive feedback. One of the most effective ways of ameliorating students' fear of failure is to offer positive feedback when they make contributions to the lecture. Learning theory has provided ample evidence that reinforcement is a significant component of effective learning. Of course, a major problem facing the teacher is the difficulty of giving positive feedback to a large group of students participating in a learning endeavor. Although it may be unrealistic to give positive feedback all of the time, the teacher's overall behavior should reflect a commitment and ability to use positive rather than aversive and punitive forms of control.

- Display a sense of humor. It is often effective, in terms of gaining student attention, to tell a story or share an anecdote. This does not mean that the teacher must do a comedian's routine to produce an environment conducive to learning. Being funny is not nearly as important as having a sense of humor--laughing with students and showing them that you, the teacher, appreciate occasional levity, too.
- Use conversational style. Rhetoric may be an interesting field of study, but the classroom is not an appropriate place for the teacher to practice oratorical skill. Explicit language delivered in a logical manner and in a customary conversational style helps students focus on what is being said rather than how it is being spoken.
- Be alert to voice quality--tone, rate, enunciation. Students may not be listening even though they are able to hear the teacher. In part, the selection process is dependent on the speaker's rate of speaking, the tone and enunciation, as well as the content of the message. That is, students "select" consciously or unconsciously what they will listen to and what they will "block out." It is important, therefore, for the teacher to vary rate of speech according to the type of material being discussed, to pause occasionally and give students a chance to cognitively process the information, to vary pitch and intonation for interest, to give stress to points of significance, and to enunciate words so that they can be understood. Teachers who read from prepared notes rarely achieve appropriate voice quality.
- Show enthusiasm. "Enthusiasm is contagious" may be a hackneyed cliché, but the message is still pertinent. Of course, genuine enthusiasm cannot be forced, but it can be nurtured if the teacher constantly searches for new and useful materials that make the subject not only more interesting and relevant to students, but to the teacher as well. If you feel that what you are teaching is meaningful and worthwhile, your students will be able to sense this enthusiasm.
- Be prepared. Knowledge of the subject matter and careful preparation are essential to motivating students. When teachers do not feel comfortable with the material, they tend to react defensively toward student-initiated questions, often leading to student contempt and boredom.

- Be flexible. How are you going to deal with student questions, or with student denials of what you are saying? Will you react defensively? Probably the most effective teacher behavior in handling these types of situations is exhibited by the instructor who is able to be open and honest with the students. The teacher who can indicate a willingness to explore new responses and exhibit a willingness to change will find that the students will also begin to develop these behaviors.
- Use the experiential background of the audience. Lectures should be related to students' backgrounds, knowledges, skills, and interests.
- Don't rehash textbooks or other materials the students have read or should have read for themselves. The lecture should present new and fresh ideas not readily available to students.
- Verbal and visual illustrations. Talks should be replete with verbal illustrations. Illustrations can accent abstract ideas. Lectures can also include simple visual aids such as specimens, flat pictures, chalkboard sketches, or transparencies.
- Provide a summary. Each lecture should include a summarization at its close.
- Help students develop note-taking skills. Give the class instruction (especially at the secondary level) in taking simple notes and in organizing verbal material.

Discussion techniques. What is a "discussion" as it applies to teaching and learning? For purposes of this module, and so that the separate parts of the discussion process may be more clearly delineated, a discussion is defined as including these elements: (1) a small number (3-15) of students meeting together, (2) who recognize a common topic or problem, (3) who are being directed toward some goal (often of their own choosing), (4) who initiate, exchange, and evaluate information and ideas, and (5) who interact verbally.

Why use discussion? The principal purpose of a discussion is to promote meaningful personal interaction, and of course, learning. The learning may involve skills, attitudes, or processes. An accepted psychological principle is that people learn best when they are actively involved or participating,

Thus, if a teacher desires to promote a wide range of interests, opinions, and perspectives, small group discussions are one way to accomplish the goal. If a teacher desires to have different students doing different tasks or activities at the same time, all leading to meaningful goals, then discussions are appropriate. If a teacher desires to practice indirect control of thought, then discussion is an appropriate technique. If a teacher desires to structure some informality in the group, then the use of discussions would be a means to that end.

A variety of discussion techniques have been successfully used and described. These can be classified in several ways. Here we identify and list nine types. These are not discrete types and some actually involve the use of several of the other identified types. The vocational education curriculum specialist must be aware of the characteristics of different types of discussion groups to recommend their proper use. In the following descriptions, the groups are listed in descending order of teacher (leader) control.

- Didactic--A small group discussion type in which the primary purpose is to give information to participants is commonly called a "didactic" group. The basic procedure for the didactic group is to subdivide the class into small groups where either the teacher, a teacher aide, or a student leader presents some information or material to others. The didactic group is small, probably five to seven members, and is highly product-oriented. The teacher should encourage students to lead the group if they are ready. With some of the shy or less confident ones, this may take considerable effort.
- Tutorial--Usually the tutorial discussion group is used to help students who have had difficulties in learning or in progressing at a satisfactory rate. The tutorial group focuses on a narrow amount of material, and only a few students (four to five) are in the group. The person who leads the discussion has three major functions to perform:
 - (1) question the students to pinpoint the exact problem that is blocking learning;
 - (2) provide information or help to facilitate learning; and
 - (3) encourage the students to question and answer among themselves.

Prior to using student tutors, a teacher must be satisfied that each potential student tutor has mastered competencies such as the skills of questioning, giving positive reinforcement, and analyzing work tasks. Many school districts are currently using student tutors and are finding them to be invaluable resources for the classroom teacher.

Although remedial work will probably be used most often to alleviate student learning difficulties, the tutorial discussion-group is an excellent method to encourage independent projects for advanced learners. Many gifted students will find it a challenge to try to explain their project to other students.

- Task--One of the least complex discussion types is that of the "task group." As the name implies, students are involved in some type of work or activity in which significant contributions can be made by each group member. Prerequisite to using the task group is the specification of clearly defined tasks to all group members. Similar to a committee, a task group has clearly defined goals and clearly identified individual assignments and roles. Further, it may be beneficial for the teacher to establish a work schedule, a system for internal monitoring of achievements, and possibly even provide all of the learning resources that may be necessary to accomplish the identified tasks.
- Socratic--The socratic group has a distinct process orientation, but product is its key element. The process is patterned after the teaching style of Socrates, who would pose a problem and then question his students until they arrived at an answer. Each response by the student produced either a challenge from Socrates or a new question leading to the solution of the problem.

This type of discussion can accommodate a large number of participants. The one caution is that if 10 to 15 students are in the group, then the teacher must challenge all to become involved and not let just a few do all the interacting.

Students should be given a brief overview of how the group process works. They need to understand that the main role of the teacher is to be an "information or opinion seeker" and "facilitator," and that the students' role is that of "information or opinion giver" and "clarifier or elaborator." The typical way to

start a socratic discussion is to pose a problem to which student responses can be determined through an exchange of information or opinions, or through the utilization of appropriate reference materials.

Students should also be told that this discussion type has two basic stages: the analytic stage and the synthetic stage. During the analytic stage, the discussion leader must make a snap decision after each student response to determine whether to challenge the response, reject the response because it is going in the wrong direction, accept the response as being totally correct and move to the next logical question, or use part of the response in formulating the next question or statement.

After the teacher has had an opportunity to demand self-analysis and self-criticism of the comments or arguments that have been made, the analytic stage is over. The teacher then calls for an interim recess, or rest period, and attempts to summarize all of the points that have been made as well as the errors of logic or fact. After the summary has been posted, the teacher prepares for the synthetic stage.

The synthetic stage commences when the teacher asks the students to begin to evaluate statements that have been presented and to rephrase or reform the statements so that they become more valid, more descriptive, more operationally defined or accurate. During this stage the teacher must be very supportive and attempt to clarify all statements. The teacher's role is that of synthesizer and summarizer.

- Brainstorming--Every school subject has some elements that require students to do some free-wheeling, thinking. This is when you want to use a brainstorming group. Any number of students can become involved in a brainstorming study. The shorter the period of time for discussion, the fewer the number of group participants, so let time dictate the size within a 5- to 15-minute limit.

The discussion is started by the leader, who briefly states the problem under consideration. After the topic is stated and before interaction starts, it is crucial to select a method of recording the discussion. It could be taped, or one or more students who write quickly could serve as recorders. The leader should also stress to the group that all ideas need to

be expressed. All participants need to realize that quantity of suggestions is paramount.

The following rules for using the brainstorming technique seem to be especially important.

- (1) All ideas, except for obvious jokes, should be acknowledged.
- (2) No criticism is to be made of any suggestion.
- (3) Members should be encouraged to build on each other's ideas. In the final analysis, no idea belongs to an individual, so encourage "piggy-backing."
- (4) Solicit ideas or opinions from silent members. Then give them positive reinforcement.
- (5) Quantity is more important than quality. However, this does not relieve the group members from trying to think creatively or intelligently.

Brainstorming is an initiating process and must be followed up with some other activity. One way to follow up would be to use the ideas generated in the brainstorming session as the basis for another "type" of discussion. After the discussion or brainstorming session, it is important that ideas be evaluated and as many as possible be used by students in follow-up activities. The evaluation of a brainstorming session should not be lengthy and it should be non-threatening for the participants.

- Buzz--The buzz group is best suited to a small number of students (five to seven) who are fairly self-directed. The teacher should be an outside observer, although it is permissible to provide resource help if the group asks for it.

Discussion is opened with a background event, then the class divides into groups. Each group discusses some specific question arising from the event. The group should have a leader who will direct the discussion and then serve as spokesperson in reporting to the other groups.

Each group conducts its own discussion for approximately 10 to 15 minutes. The group tries to arrive at a consensus answer for the question the members are

discussing. At the end of the discussion period, each of the leaders reports his or her group's consensus. This can be followed with a large group question-and-answer session led by the teacher, or the class might choose to go into task groups to pursue some aspects of the problem.

- Phillips 66--The "Phillips 66" discussion group involves exactly 6 students. It is established quickly and does not call for orientation of students, and students do not have to be highly skilled in group interaction for this type of discussion to work. In fact, the Phillips 66 technique is most appropriate as an initial mixer activity.

The class is divided into groups of six. The groups then have one minute in which to pick a secretary and a leader. The teacher gives a clear and concise statement of the problem or issue for discussion. The time limit for the discussion is then started, and students have exactly six minutes to come to an agreement as to the best solution of the problem. Other than starting the discussion, the teacher has no formal part in the discussion group.

- Discursive--The discursive discussion group has free and uninhibited discussion by students on a topic that they select. The discursive discussion, therefore, is one that is totally student managed and oriented to student issues or topics. The major factor in determining the size of the group is student interest. As many (up to 15) students as are interested in the topic can participate. The length of time will also vary with each discussion session, and no absolute time guidelines can be given. However, it is often wise to end the discussion before the subject is beaten to death. This maintains interest for the next discussion period, because the students know that they will get another opportunity to express themselves.

The demonstration method. An effective demonstration combines words and actions in an interesting pattern to create a desired response in the observer. It is an effective method of learning concepts in vocational education because of the close relationship among development of knowledge, attitudes, and skills. The vocational educator uses the demonstration method for several reasons. First, it presents proper methods and procedures for attaining desired results. Second, it introduces new and different techniques to the learner. Third, it

displays essential behaviors that contribute to successful employment. Finally, it aids in setting standards for work habits and motivating students.

The final success of a demonstration is measured by the changes in behavior of the people who hear and see it. To use this technique effectively, the user must have a working knowledge of its advantages and disadvantages.

DEMONSTRATION METHOD

Major Advantages

- Allows for easily varied involvement of observer
- Includes all areas of learning: cognitive, affective, psychomotor
- Stimulates interest and curiosity
- Allows use of a variety of apparatus, materials, and supplies

Major Disadvantages

- Requires set up and practice
- Not viable with large groups
- Depends on availability of materials and supplies
- May require excessive cost and time to achieve one objective

Regardless of the subject, the basic techniques of a good demonstration are the same. The effectiveness of the demonstration is directly correlated to the amount of preparation and planning used by the demonstrator. When planning a demonstration, careful consideration should be given to the questions listed below.

- Choice of Topic
 - (1) Consider the audience
 - a. What are the interests of observers?
 - b. What is the ability level of your students?
 - c. How many are there, and what age do they represent?
 - d. What do they already know about the topic?
 - e. Is the topic relevant to their current and future needs?
 - (2) Limit topic to one central idea
 - (3) Select the title
 - a. Is it short?
 - b. Is it descriptive?
 - c. Does it stimulate or arouse curiosity?

- Statement of Purpose

- (1) State the main objective

- a. What is the statement of educational value?
 - b. Is the purpose to entertain, stimulate, convince, or create a desire to learn?

- (2) Consider audience involvement

- a. What response is required from the audience?
 - b. What skills, knowledge, and attitudes are necessary for their participation?
 - c. How can students help in the presentation?
 - d. Is student interaction possible?
 - e. Is consideration planned for learners with special needs?

- Selection of Content and Information

- (1) Select information essential to the objective

- a. Is it relevant and up to date?
 - b. Is it accurate or biased?

- (2) Plan review of background terminology or prerequisites

- Sequencing of Steps

- (1) Plan organizational pattern

- a. Is the outline logically developed?
 - b. Is detail sufficient to obtain key concepts?

- (2) Plan a balance between talk and action

- a. What verbal points need to be emphasized?
 - b. What actions need emphasis?

- (3) Plan pre-preparation processes

- a. What stages require advanced preparation?
 - b. How much pre-preparation is necessary?
 - c. What integration is required between stages?

- Planning Visuals, Equipment, and Supplies

- (1) Integrate relevant media

- a. Are all visuals and pieces of equipment necessary?
 - b. Do they focus attention? Are they easy to use?
 - c. Do they fit smoothly into the demonstration?

- (2) Pre-check all materials, supplies, and equipment

- a. Are tools, equipment, and supplies ready and functioning properly?
 - b. Is the arrangement planned for a viewing audience (large enough, neatly lettered posters, sturdy)?

- (3) Consider observer involvement

- a. How many "senses" are involved (sight, hearing, smell, etc.)?
 - b. What is the level of student/observer involvement?

- Practice

- (1) Do a "dry run" of the demonstration

- a. Is the action synchronized with the explanation?

- b. Is there a logical order of activity within the time limit?
 - c. Was equipment used skillfully?
 - d. Were the following personal qualities appropriate: posture, eye contact, voice, mannerisms, general grooming, rate of speaking. grammar?
- (2) Allow time for modification and reorganization

All the time spent on preparation is wasted unless the presentation is smooth, is easily executed, and has continuity. Familiarity with each step in the demonstration will help the handling of materials to be automatic, do away with the possibility of the unexpected happening, and allow the demonstrator to focus more attention on what is being said and done. Do not brush off a mistake; instead, explain what happened and what could have been done to prevent such an occurrence.

The final stage in the art of demonstrating is to critique the effectiveness of the presentation. Having a successful demonstration is possible only if the observers understand and are able to behave differently as a result of observing the demonstration. Standards must have been maintained so the students will have adequate guidelines to follow in their performance.

The laboratory method. The laboratory is an extension of the traditional classroom that allows the student to understand concepts by relating them to practical situations. It gives the learner the opportunity to work with proving hypotheses, thus permitting first-hand experience for gaining knowledge.

The laboratory uses individualized instruction, job sheets, and demonstration techniques, which require a high degree of direct student involvement.

How does involvement teach? Picture yourself sitting in a lecture hall listening to someone explain how to draw a blood sample from a patient. The lecturer is very thorough and makes good use of visual aids to emphasize important points and specific techniques. At the end of this lecture, you have been told the problems you might run into, the fine details of selecting a vein, and the way you should hold a syringe. Will you be able to successfully draw a sample from a patient? Probably not.

Now, imagine holding a syringe in your hand and feeling the arm of your patient to find a vein. You are able to feel the texture of the skin, the size and depth of the blood vessel. You can see the apprehension in the face of your patient. These

impressions cannot be taught by a lecturer, but experiencing them will enable you to become proficient in your task. You need active involvement.

The same is true in all vocational programs. The student needs the chance to interact with the task, to learn by doing.

Involvement also stimulates interest and motivation. It creates the potential for students to examine attitudes and values about the career they are preparing for, especially those that are intangible. In the medical laboratory, the outcomes of an assay are unknown, and controls and standards are used to monitor the proper outcome of the technique. If the control and standard values are not within their acceptable ranges, the assay is invalid. If only slightly out of range, is the assay still invalid? Can the results be "juggled" into range so that the assay can be considered correct? Is the time involved worth the effort of repeating the assay? Is it all right to manipulate the results when a patient's well being is at stake? Is it all right to do it even if the results are not that critical? These questions must be dealt with through involvement in the occupation and the attitudes that are a part of it. They cannot be answered after a lecture on medical ethics.

Several types of laboratories might be used in vocational education.

- Experimentation and Skill Building--This is a form of laboratory used to verify or discover facts and to develop specific skills. The objectives of the experiment will determine the task or experience. "The student will show that metals melt at high temperatures and determine the temperature at which iron melts," or "The student will be able to operate the smelter using proper safety equipment." Often both objectives (of verifying facts and developing skills) can be combined, and the experience can perform a dual purpose: "The student will prepare wet mounts, using normal saline, 2% sodium chloride, and distilled water, to demonstrate the susceptibility of red cells to their environment...." In this case the student verifies a physical property of the blood cell and practices the preparation of wet mounts.

The teacher should state the purpose of the lesson and show its relationship to the theory taught previously. The teacher then demonstrates those areas that are unfamiliar to the student. It is possible to change the "givens" to allow for a variety of results. This

enhances the opportunity for the student to analyze the procedure and draw conclusions about the experience.

Upon completion of the activity, the students write a report or complete a summary sheet to record their findings. Discussion of all outcomes allows for evaluation of each student's results in comparison to peers.

The laboratory experience contains a combination of operations that exist in the actual job, and provision should be made for the repetition of these operations through other assignments to assure a high level of skill development.

The student can be given the opportunity for learning by discovery in a similar situation. This can be done by allowing the student to conduct experimentation to verify a hypothesis. This approach is thought to be extremely challenging, but it is also more time consuming, and the instructor must plan more carefully to ensure that progress is made in the right direction. For example, students in agriculture might be asked to formulate and prove hypotheses about environmental conditions on growth of plants. In industrial education, a learner might experiment with the composition of aggregates to determine qualities of concrete.

- Task Force Production--This type of laboratory is a modification of the small-group production process used in industry. In its beginnings, mass production revolutionized industry with its assembly line, but the worker had to pay for this with physical and mental problems that resulted from job dissatisfaction. To counter this, automobile manufacturers developed a team approach to production, with a team of workers being given complete responsibility for completion of major components of a car.

In the classroom, task force production offers a combination of technical, managerial, and social roles with emphasis on the development of the student as well as the product. Each individual, in a group of three to five students sharing common production interests, works in all phases of management, planning, and production.

The student is introduced to the concept of task force production, the principles of mass production, and the organization of industry. Then the student is involved

in determining the product that will be created; each becomes aware of the needs of the consumer. Grouping of students by interest in a product choice is the next step. Management is shared by each group member, and all phases of production are practiced--design, selection of materials, packaging, and distribution.

At the end of the production period, each group reports to the entire class. Each phase of production is reviewed, discussed, and evaluated. The end result is more than an acquisition of psychomotor skills. It includes development of group interaction and decision-making ability as well as a more intimate understanding of industry and production. The planning and preparation for such a laboratory experience is time consuming, but the benefits of the outcomes are well worth the effort.

- Project Method. This method coordinates classroom instruction with selected activities or projects related to the individual occupational objectives of the student. It attempts to offer outcomes similar to those of cooperative education, with more control by the teacher as to the pace and nature of the experience. The projects are of four categories. Directed observations include such activities as viewing selected films, attendance at trade shows, making customer calls with sales representatives, and guided field trips. Analysis and evaluation uses case studies, interviews and surveys, readings in trade journals, and comparisons of profit and loss statements. Discussion involves carrying out various discussion techniques to expand knowledge of an area of exploration. This category has the added benefit of developing communication skills. Practice allows actual work with necessary processes. These include participating in employment interviews and roleplaying to aid in decision making and problem solving.

Success of the project method depends on established criteria. Specific objectives must be set for each individual and activity, and adequate time must be allotted to the student for participation in the activities.

Questioning techniques. As children we start to question almost as soon as we learn to talk. We are curious about everything, so we ask what? why? where? when? Throughout our lives asking questions serves as a primary motivator of learning.

Therefore, one of the most important skills for the teacher and the curriculum specialist to learn is effective questioning.

Questioning is a dynamic process. It is a useful art or tool, and, in the hands of a skillful teacher, serves numerous learning purposes. Good questions stimulate and encourage students to question themselves, other students, and the teacher. Good questions act as a sounding board against which the correctness or acceptability of ideas may be tested. They promote the aims of the lesson in a concise manner and encourage discussion. To reinforce appropriate "response behavior" a teacher must provide a high degree of positive feedback or positive reinforcement to each student when appropriate responses are elicited.

Questions may be asked to elicit simple recall; to compare and contrast; to choose alternatives; to classify, illustrate, or give examples; or to present a relationship. Other types of questions may ask the students to describe, explain, outline, or organize ideas in one of several ways. Questioning activities can be classified as convergent, divergent, and evaluative.

- Convergent Questions--Convergent questions focus on a rather narrow objective and on a central theme. Convergent questions tend to elicit yes, no, or very short answers. A teacher utilizing the convergent pattern is probably asking students to demonstrate knowledge or comprehension of specifics.
- Divergent Questions--A divergent questioning technique is the opposite of the convergent technique. Rather than seeking a single focus, one seeks responses that lead to a spectrum of responses. Divergent questions also elicit longer student responses. For example, the teacher might ask a question that can be answered with multiple responses, call on three or four students, and then assume a passive role in this mini-discussion. If a goal of the teacher is to allow or encourage novel solutions and creative responses, the divergent method is appropriate.
- Evaluative Questions--The third basic pattern of questioning utilizes divergent questions but with one added component--evaluation. The basic difference between a divergent question and an evaluative question is that the latter has a built-in evaluation or judgmental set of criteria. When one asks why something is good or bad, he or she is requesting an evaluation. However, to prevent the generation of only a poor collection of uninformed student opinions,

the teacher must provide a set of criteria or specific items as a model for students to develop their own sets of criteria.

The inquiry method. There is little doubt that questioning plays a critical role in the teaching act. However, the typical questioning process is generally conducted by the teacher, usually for the purpose of finding out which students have studied and which have not. On some occasions questions are asked to help students gain knowledge from their peers, from their texts, or from the teacher. Only rarely do students ask questions, and then only to obtain a factual answer--typically from the teacher.

Recently, a different type of questioning technique has become a part of many teachers' repertoire of instructional strategies: questioning by the students--not to acquire a single factual answer, but investigative questioning to solve important physical, behavioral, philosophical, and historical problems. This questioning technique is called the inquiry method.

The inquiry method does not stress the accumulation of authoritative information and facts. Rather, it is a strategy that emphasizes discovery and problem solving. It is a plan of action that enables the pupil to discover relationships and cause and effect variables. The student is encouraged to utilize the methods of the scientific approach: to observe events, formulate hypotheses, test the hypotheses through verbal or active experimentation, analyze and interpret the results, and formulate generalizations.

When using this method, the teacher should only participate as a facilitator, providing necessary additional information when properly asked, and, in some situations, acting as a guide through some very complex ideas. Often when students have gained sufficient information to develop a hypothesis they think is conclusive, the teacher will want to provide some additional information that acts contrary to the student's hypothesis.

Here's an example of an inquiry activity.

AN INDUCTIVE APPROACH TO TEACHING HEAT CONDUCTIVITY IN HOUSEHOLD EQUIPMENT

The concept of heat conductivity can be difficult for high school students to comprehend. Below is a brief outline of how this concept might be taught using the inductive method.

- Objectives. The purpose of the lab experiment is to allow the student to be actively involved in making an inductive device (pan conductivity "fingerprints") that will be used to arrive at the following generalizations:
 - (1) Different types of pans conduct heat at different rates.
 - (2) Some materials conduct and distribute heat better than others.
 - (3) Pans will need varying amounts of heat and heat control depending on their conductivity to accomplish similar "prints."
- Procedures. The lab experiment on heat conductivity and pans can be used for either a high school or college home economics class. A lesson on heat conductivity can be used as an introduction to electrical conductivity if the teacher desires.

Part I:

Equipment (per range)

- (1) Two or more pans of various materials of approximately the same diameter
 - a. aluminum (light and heavy weight)
 - b. pyroceram
 - c. stainless steel
 - d. cast iron
 - e. porcelain
 - f. glass
- (2) Vegetable oil (approximately 2 tablespoons per pan)
- (3) Paper towels
- (4) Pastry brush
- (5) Scissors
- (6) Tongs
- (7) Wax paper
- (8) Dish cloth and towel

Procedure for pan "fingerprints"

- (1) Preheat burner to medium-high heat.
- (2) Cut paper towel to fit bottom of pan.
- (3) Coat pan lightly with oil (approximately 2 tablespoons).
- (4) Place a paper towel in pan, patting until all of towel is saturated and no air bubbles remain.

- (5) Place pan on preheated burner.
- (6) Record time from moment pan is placed on burner until most of the towel turns a medium cocoa-brown (teacher provides a model for comparison).
- (7) Remove paper towel immediately and place on wax paper.
- (8) Label "fingerprint" with pan type and time.
- (9) Wash pans in hot soapy water.

NOTE: On each successive trial, leave pan on burner until the paper towel is the same degree of brown.

Part II:

Before making the pan "fingerprints," the class can discuss the pans to be used and list hypotheses as to how they think each pan will rank in conductivity.

Upon completion of their pan "fingerprints," the students should discuss and analyze their findings, construct a table or graph showing the pan conductivity results, and alter and/or evaluate their previously made hypotheses.

Simulation, games, and roleplaying. Simulations, games, and roleplaying are attempts to model a portion of reality in an artificial situation. They reproduce the social, economic, or political process of particular systems of social interaction. Students assume roles in the system and try to understand how the system operates by participating in it as a member, not an observer.

The table on the next page shows the characteristics of games and roleplaying and how each strategy is a part of the broad category of simulation.

Individualized instruction. Every student has a particular set of entry skills, learning styles, goals, motivations, abilities, rates of learning, degrees of retention, strengths, weaknesses, self-discipline, and problem-solving abilities when entering a classroom. To teach effectively each student in a class, the teacher must offer a variety of methods or strategies.

You are aware of instructional strategies such as lecture, discussion, inquiry, questioning, values clarification, demonstration, field experiences, independent study, laboratory, and

CHARACTERISTICS OF SIMULATION, GAMES, AND ROLEPLAYING

SIMULATION

GAME

ROLEPLAYING

A. MOTIVATION INCENTIVES

Subject matter generates enthusiasm for or commitment to learning in a subject area or in a course, or to learning in general.

The scoring system provides rewards which depend on the results of the players' decisions.

Players visualize themselves in another person's situation which is not threatening.

B. RULES

1. A clear statement of objectives

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2. A realistic situation

2. A set of rules

2. Allowance of sufficient time to complete roleplaying

3. A simple situation

3. The agreement of all players to abide by the rules and objectives

3. A simple and spontaneous situation

4. A non-threatening experience

4. A procedure for critiquing or evaluation

4. Should deal with human relations

C. LEARNING EXPERIENCES

Focuses upon the development of personal and technical skills of supervision and decision making

Student interaction in which verbal and interpersonal skills are developed

Stimulates thought or discussion of different ways of approaching a problem, situation, or controversial matter

D. DESIGNING EASE

More difficult to design than roleplaying as the consequences of each possible combination of players' decisions must be built in. Must realistically represent resources each person has available in the real situation and the value to each.

Once the rules and objectives have been defined and agreed upon, a small group can play the game in a limited time.

Easier to design than a simulation game. Designer need only (1) write descriptions of each role, (2) state each player's objectives in general terms, and (3) add a few rules to prohibit grossly unrealistic behavior.

simulation and games. Individualized instruction creates an environment that allows students to interact with the strategies that are best suited to their needs.

How do teachers and students relate in an individualized program? Since individualized instruction is student-oriented, it requires a diagnosis of student development to determine the kinds of learning experiences they require. After these needs are properly identified, instruction can be largely pupil directed and pupil administered and, within the limitations imposed by the school's broader time requirements, learning can be adjusted to the learner's needs and capabilities. The strategy assumes that students have the ability to work on their own. The instructor will be used for assistance in providing materials and learning activities at the appropriate time.

In organizing individualized instruction for your school district, you should account for the various components that make up an individualized program. You may want to create some of these components on your own or incorporate parts of other currently existing programs of which you are aware. Regardless, a complete individualized instructional program will have the following component parts.

- Diagnosis--A student's interests, motivation, and independence can be determined by teacher-made questionnaires and by as many teacher/student conferences as needed. Some students learn best by hearing information, others by seeing or reading it, and others through physical manipulation of the environment. Students differ in styles of learning, times of greatest alertness, length of attention span, and types of group work preferred.

Entry skills can be diagnosed by a number of standardized tests. In the vocational-technical education field, standardized tests may be procured from the state department, counselors, advisory committees, and industry. Teachers may assess entry skills by using traditional paper-and-pencil tests, student performance tests, or evaluation of work samples.

- Prescription/Selection of Instructional Objectives--During the prescriptive stage, the teacher should explain the learning alternatives that are available to the student. The student may not be familiar enough with the various learning alternatives or the subject matter to be aware of all options. The teacher should also discuss with students their responsibilities for choosing learning objectives that are consistent with

their skills, expressed interests, and goals. During prescription the teacher must assist the student in developing skills in choosing, planning, and self-observation.

The formation of instructional objectives requires the teacher to specify what behavior the student is to perform, the environmental conditions for the behavior, and the criteria for success. The teacher can then break these objectives into carefully sequenced enabling objectives that allow a student to proceed step by step toward mastery of the overall objective.

Ideally, an individualized program not only deals with cognitive learning objectives and test measures, but also with attitudinal objectives. The cognitive performance objectives should not just require simple recall of facts and specific information.

Coupled with the preparation of instructional objectives is the preparation of pre- and posttests and suitable learning activities. These are designed for pre-assessment to allow for individual differences in knowledge and provide the proper starting point in a sequence of learning activities. The post-evaluation assesses comprehension of the required knowledge.

● Materials and Equipment--Suggested criteria for the purchase and production of media are as follows:

- (1) Select the medium that will help teachers accomplish their objectives. If a teacher specifies that students are to identify different kinds of models from ten slides, they must have practice looking at slides. Sketches won't do in this case.
- (2) Select media that allow students to proceed through the unit in short steps and that provide immediate feedback.
- (3) Select media that will make it possible for teachers to finish producing the unit efficiently. Individualization already demands much teacher time. The process should not require more technical know-how to administer in the classroom than most teachers can reasonably be expected to possess.
- (4) Make sure that a good number of teachers can use the newly produced or purchased unit. Not all

teachers may have the same equipment available. Some may wish to use only a part of the unit or to make alterations. These kinds of teacher adjustments should be possible.

- (5) Finally, select media that foster the most learning for the least possible cost.

Teaching Methods--An individualized instructional program should employ as wide a variety of teaching methods as possible in response to the varying learning styles within any class. All teaching strategies have their value within individualized instruction, although some are more applicable than others. Lengthy lectures, for example, should usually be replaced by cassette recordings, workbooks, or filmstrips, which allow students to learn in steps and provide more opportunities for immediate student feedback. Some students may occasionally feel more comfortable as part of a group, where the activity is largely teacher-directed. Group methods especially suitable for individualized instruction are simulations, games, laboratories, field experiences, discussions, and the inquiry method. In general, teaching methods used within individualized units should be evaluated according to the following criteria:

- (1) The intended teaching method should be clearly defined, but the program should allow for teacher adjustment.
- (2) Methods used should encourage as much varied response and participation on the part of students as possible. Independence in making choices should be stressed.
- (3) Even as students are allowed to select teaching methods that meet their needs, the choice of methods should be organized so that a student is encouraged to experience a variety of groupings during a school day: working alone, with a partner, with a teacher or tutor, in a small group, in a large group, etc.

Learning Settings--Whether an, individualized unit ultimately "works" is dependent on the learning settings, and this component can be the most demanding in terms of school and district-wide coordination, funding, and planning. Many highly successful individualized programs deal with a single subject area and

function within a self-contained classroom. But many others have resulted in media resource centers; learning pods of team teachers organized around multiple disciplines, learning labs, computerized programs, work study, and cooperative education programs. Innovative settings continue to be tested to find what is best for each learner. The total learning center specified in an individualized program must:

- (1) make learning resources easily available to the student;
- (2) provide for a variety of social interactions in a student's day;
- (3) organize the various interests and instructional styles into a number of designated areas in the learning setting and then allow for student-initiated movement among these areas; and
- (4) have the general support of the teachers who work within the structure of the learning setting. Some teachers don't enjoy team teaching and are dynamic soloists, while others feel that individualization necessitates teamwork.

● Instructional Time--An acceptable individualized instructional unit is one in which the instructional time meets the following criteria:

- (1) A fairly accurate estimate of the average class time taken by a particular unit must be established, as soon as verification allows, to implement planning.
- (2) At the same time, students must be allowed to establish their own pace for completing the unit. If students experience difficulty, it is an indication that the unit needs revision.
- (3) The instructional time should not be focused solely on completion of the basic or required performance objective.

● Evaluation--The evaluation component can point to where in the program the student should begin his or her study, how he or she should progress through the program, and in which direction the student's future development should go. Criteria for evaluation measures are as follows:

- (1) Every program must contain a pretest and posttest that adhere to acceptable standards of test construction.
- (2) The material cited in the pre- and posttests must be embedded in the content of the individualized program. No surprises!
- (3) The pre- and posttests must correspond to the performance objectives and to the learning activities. If the performance objectives state that the student will be able to identify six kinds of molds from slides, the pre- and posttests must require the students to look at and identify slides.
- (4) Opportunities for the student's self-assessment should be provided in addition to teacher evaluation. An example: "Use the following exercises for further practice until you feel that you have mastered this skill. Then see your teacher about going on to the next instructional objective." Or, "Select the subobjective that was most difficult to master and ask your teacher for additional practice materials."
- (5) Ideally, the evaluation component should provide the student with alternative choices for the next step of the individualized instructional program.

Independent study. Independent study is individualized instruction with certain qualifications. For our purposes in this module, the definition of independent study includes any learning activity that is motivated by the learner's own aims and is done independently of class, utilizing the teacher primarily as a resource person. Learners have a voice in determining what, when, and how they learn. Independent study is student-directed rather than teacher-directed. When an independent study activity is evaluated, both the student and teacher are involved in the evaluation procedure. One goal of independent study is to have students improve in their ability to evaluate themselves. Students involved in independent study must have access to a variety of resources. Following are examples of independent study in vocational education.

- An on-the-job training (OJT) situation where the student becomes interested in a related operation of the business and pursues an independent study program in greater detail. The study must be purposeful activity that is well planned and directed. Independent study

is not random acquisition of knowledge and skills as a result of performing regular OJT duties.

- A shop skills project that goes beyond normal class requirements. Again, students must be responsible for defining the parameters of this inquiry and must systematically accomplish their objectives on their own initiative. Shop-related mechanical problems are numerous and ideally lend themselves to implementing problem-solving techniques.
- An independent study of certain aspects of the job that the student becomes interested in as a result of being released from school to observe an occupation in a laboratory situation.
- A self-motivated industrial arts student creates an original design to solve a practical problem. Generally speaking, this activity would be above and beyond regular class requirements and expectations.
- An in-depth study of a particular aspect of a supervised home project commonly found in vocational agriculture and home economics. Frequently, the independent study project will overlap with regular classroom activities. This form of independent study is ideal, because it relates the extended learning activities to the classroom activities.

Field experiences. The objectives of general and vocational education lend themselves to field experiences in which the student:

- becomes aware of the world of work;
- becomes aware of his or her own aspirations regarding occupations;
- earns money;
- puts theory into practice; and
- gains experiences not available in the classroom.

The amount of teacher involvement in field experiences varies. For cooperative education programs, the teacher is directly involved in coordination, supervision, and evaluation. At the other end of the continuum, work-study programs require negligible involvement by the classroom teacher. The following

material describes the characteristics of seven types of field experiences.

- Apprenticeship--Apprenticeship is an experience lasting between two and eight years in which instruction is supplemental to the daily employment of the student (apprentice). The apprentice is selected by a joint apprenticeship committee composed of members from industry and labor.

Purpose: To allow the student to learn and perform, in a productive setting, under the supervision of an experienced employee (master).

Level: Students must be at least 18 years old. The experience is limited to apprenticeable trades.

School/work relationship: Education provides the facilities and the related instruction that is taught by a skilled journeyman. A formal agreement binds the employer to provide instruction in exchange for the work of the apprentice, who is paid for his or her work. Supervision of the apprentice at the work station is the responsibility of an experienced employee (master).

Vocational application: Trade and industrial education.

- Internship--Internship is usually a culminating experience that occurs after the classroom instruction is completed. The student works in a professional situation, under supervision, and is usually paid. The internship is generally full time and lasts at least one semester.

Purpose: To allow the student, in a realistic situation, to apply the attitudes, knowledge, and skills learned in the classroom.

Level: College (two- or four-year) in professional and sub-professional occupations.

School/work relationship: The student learns theory in school, then applies knowledge, skills, and attitudes in a work experience after the schooling is finished. Often, the internship site is selected by the school. The major responsibility for student supervision is usually at the work station, but in cooperation with the school.

Vocational application: Health occupations, engineering technicians.

- Non-Paid Work Experience--In non-paid work experience the student actually performs work for an employer but does not receive pay. The student's experiences and training are carefully and specifically planned by the school and the employer in order to comply with strict legal regulations.

Purpose: To offer an exploratory or training experience that contributes to the student's employability, utilizing non-paid experiences in situations in which a paid experience is not feasible.

Level: Usually juniors or seniors in high school. Could be appropriate to any secondary or postsecondary program.

School/work relationship: Varies with the intent of the experience. If exploratory in nature, the role of the school is (1) providing occupational information and (2) planning and supervising the work experience with the employer. If training is the purpose, the role of the school is very similar to that in a cooperative education program. In either case, the employer must be very careful to comply with conditions of the Fair Labor Standards Act relating to an employment situation. The employer provides training and supervision at the work station.

Note: Extreme caution must be used with this instructional strategy because of the legal questions relating to an employee-employer relationship.

Vocational application: All vocational service areas at the secondary or postsecondary level.

- Work Observation--Work observation is usually used in combination with other field experiences. The student observer is not paid.

Purpose: To allow the student to become aware of and to explore the nature of work or of an occupation.

Level: Used frequently in career education programs, especially the middle grade levels. Could be used at any level.

School/work relationship: Since this is primarily an exploratory activity, there is little, if any, instruction that is directly related to the occupation. A classroom discussion might focus on general occupational information. The role of the school is to arrange the opportunities for students to observe work and to provide transportation. The role of the work situation is to provide the opportunities for students to observe work under safe and meaningful conditions.

Vocational application: Pre-vocational and career education programs, but could be used as an instructional strategy in any vocational area.

- Paid Work Experience--Paid work experience programs offer students an opportunity to work for pay as producing employees. The work experience is not necessarily, nor usually, related to the student's occupational goal.

Purpose: To meet general educational goals such as: exploring the world of work, allowing wage earning while continuing education, providing an alternative to the regular curriculum, and increasing student motivation toward the regular curriculum.

Level: Secondary or post-secondary.

School/work relationship: There is generally no related class, and supervision by the school is limited. Students are released from school for a portion of the school day and may or may not receive academic credit. Supervision of the student at the work station is the responsibility of the employer. Usually the responsibility of the school is to assist the student in finding employment; if released time and school credit are a consideration, the school validates employment and the number of hours the student is working.

Vocational application: Not considered vocational in a strict sense, but can be used by a school to meet the general educational goals as stated above.

- Work-Study Program--Work-study is a program that offers students a paid experience with an educational or public agency. The students must qualify as needing earnings to continue their education. They are economically disadvantaged, full-time vocational students who are at least 15 but less than 21 years of age, and

they may not work for more than 15 hours per week. Federal support is for 80% of the compensation paid students and for development and administration costs.

Purpose: To provide financial assistance to students who need the earnings to continue their education.

Level: Adaptable to any level in which students meet the age requirements and are employable.

School/work relationship: There is no attempt to offer classroom instruction that is related to the work situation, nor are students released from any of their normal educational requirements. The employer alone determines what is performed on the job.

Vocational application: Any eligible vocational student.

- Cooperative Vocational Education--Cooperative vocational education (from the Education Amendments of 1976, Title I, Part C) is "...a program of vocational education for persons who, through written cooperative arrangements between the school and employers, receive instruction including required academic courses and related vocational instruction by alternation of study in school with a job in any occupational field...." The student receives both pay and credit.

Purpose: To provide classroom instruction and on-the-job work experience that relate to the student's curriculum and stated occupational goals.

Level: Secondary or postsecondary.

School/work relationship: The school provides academic instruction and related vocational instruction. Both classroom and work experiences are planned and supervised by the school and employer so that each contributes to the student's education and employability. The employer provides the laboratory where the student can apply the related vocational instruction provided in the school. The work station also offers the student an opportunity to acquire new competencies not available in the classroom.

Cooperative vocational education programs are very structured, with the roles of the student, school, and employer well defined.

Vocational application: All vocational service areas at secondary or postsecondary levels.

Selecting Instructional Strategies

Educational psychologists define learning as a change in behavior. This change in behavior should occur in the three areas listed below:

- Cognitive (knowledge of information, facts, and concepts and the ability to apply, analyze, synthesize, and evaluate)
- Affective (attitudes, feelings, and values)
- Psychomotor (muscular action, skill, and dexterity)

Learning, then, in the full sense of the word, is a three-dimensional activity. It requires sublearnings in each of the above areas. Learning in any one of these areas does not guarantee learning in the other two. For example, it cannot be assumed that rote memorization of facts will result in improved skill or a change in attitude.

It is important to maintain some degree of balance among the three sublearning areas. This is not to suggest that equal time be devoted to changing the learner's attitude, resulting in a smaller amount of time being devoted to the psychomotor and knowledge areas than would otherwise be the case. Each learning situation is unique and requires careful planning on the part of the curriculum specialist. Also, it must be recognized that certain teaching strategies are more effective in bringing about change in one of the three sublearning areas than in the others. The following are examples of such strategies:

- Cognitive
 - (1) programmed instruction
 - (2) lecture
 - (3) reading assignment
 - (4) worksheets
 - (5) case problems
- Affective
 - (1) roleplaying
 - (2) field interviews
 - (3) guest speakers
 - (4) group discussion
 - (5) instructor's personal example

- Psychomotor
 - (1) practice and drill
 - (2) demonstrations
 - (3) on-the-job training
 - (4) simulated performance

It should be noted that in some situations, a combination of the above strategies should be used to bring about a positive change in one of the sublearning areas. Listed below are some commonly used guidelines for the selection of instructional strategies.

- The best procedure usually is to select the least elaborate and least costly strategy that will apparently enable the learner to acquire the desired capability.
- All things being equal, well-illustrated, step-by-step verbal instructions with feedback to the student constitute the most practical, effective, and efficient strategies for most types of learning.
- If an objective is accomplished in less time with one strategy than another, it is more efficient. If the retention or transfer of the information or skill learned is greater for one strategy than another, then it is more effective for reaching that objective. When determining the approach to be followed, the best estimate of both efficiency and effectiveness will have to be followed.
- Try to select flexible strategies that can be adapted to student needs, problems, and interests.
- Strategies that give students an opportunity to share in goal-setting, learning experiences, and evaluation often produce better results.
- Students need an opportunity to work with strategies that provide opportunities to inquire, to analyze, to explore, to be active, to create, and to initiate.
- The strategy selected should give the teacher an opportunity to observe students' progress.

Individual Study Activities

From the materials provided in the module and your own experiences, complete the following activities.

1. Do your best to identify the three lectures that--from your perspective--seem to have had a significant impact on you. Recall the time and the individual who gave each memorable lecture.

On another sheet of paper, analyze the strengths of these three lectures. Try to identify and write down why each was memorable. What elements made the lectures effective? Consider the following questions.

- In what setting did each lecture occur? In a classroom or elsewhere? Was the setting crucial to the effectiveness of the presentation?
- Who (besides the lecturer) was involved? Did the behavior of the listeners account for some of the impact of the lecture?
- Was the lecture a planned event, or did it happen spontaneously?
- Was there anything special about what you learned?
- Was there anything unique about you at the time of each lecture? For example, did you feel an especially strong need to learn?

Next, try to make generalizations about the conditions that, for you, are needed for a lecture to have significant personal impact. Are there some commonalities about these three lectures that you can describe?

Finally, write down your prescription for the types of lecturing skills and techniques that you want to develop. In other words, compare your own present lecturing style with the generalizations for effective lecturing that you have just made.

2. For the following situations or objectives, select an appropriate type of discussion group. The types of groups discussed in this module were didactic, tutorial, task, Socratic, Phillips 66, brainstorming, buzz, and discursive.

TYPE OF
DISCUSSION
GROUP

- _____ a. A vocational youth group is having a difficult time with fund-raising ideas.
- _____ b. Several members of the class are very proficient at a particular task, but others are having extreme difficulty mastering the task.
- _____ c. Students complain that they are not allowed to discuss issues in which they are interested.
- _____ d. Several students have attended a leadership conference and have information that needs to be shared with all members of the class.
- _____ e. Four students are having extreme difficulty in understanding a basic concept.
- _____ f. A decision must be reached by consensus in a very short time.
- _____ g. Students demonstrate real difficulty in thinking through problems.
- _____ h. There appears to be a problem too large to handle.
- _____ i. The class is to provide possible field trip sites of interest to the subject matter being taught.
- _____ j. The teacher has a problem and appoints a committee to attack the problem.
- _____ k. Class has been in session for a full semester, and the teacher decides to let the class discuss areas of their interest in small groups.
- _____ l. The class is broken into groups of five students and given a list of malfunctions in an engine. The groups are given 10-15 minutes to reach a consensus as to steps to take to solve the engine problem.

- _____ m. The first day of class, the teacher wants a mixer activity to get students involved and acquainted.
- _____ n. Five students have failed a quiz on sales techniques, and the teacher needs to work with this group to find out why.
3. What criteria are used in selecting the demonstration method as a teaching strategy?
- _____ a. inexpensive, interesting, and easy to prepare
- _____ b. effective, involves two or more senses, and adaptable
- _____ c. efficient, adaptable, and used for large groups
- _____ d. involves two or more senses, interesting, and requires much preparation
4. Which of the following best describes the use of the laboratory in vocational education?
- _____ a. exploration of student attitudes toward work
- _____ b. practical application of principles
- _____ c. theoretical derivation of formulas
- _____ d. instruction of occupational skills
5. A series of questions is listed below to aid in diagnosing your analytic skills concerning basic types of questions. Place a "C" in the space provided if the item is "Convergent"; a "D" if it is "Divergent"; and an "E" if it is "Evaluative."
- _____ a. What would happen in an office if its filing system were not effective?
- _____ b. What are three basic methods for artificial respiration?
- _____ c. How might agricultural practices in the USA be changed if the country's population tripled?

- _____ d. Why would one select arc welding over gas welding in the fabrication of art objects?
- _____ e. How does a child's environment affect his or her early development?
- _____ f. How many milliliters are found in one-half liter?
- _____ g. What are some ways that a consumer of food can influence consumer choices available at the market place?
- _____ h. Explain the need for human relations training for persons in distribution and marketing.
- _____ i. How do radial tires compare to standard tires in terms of performance and price?
- _____ j. What is the definition of public relations?
6. Using inquiry as an instructional technique:
- _____ a. requires the instructor to ask questions in a skillful way
- _____ b. encourages the student to use the scientific method
- _____ c. is one of the few methods that originated in the 20th century
- _____ d. is economical in terms of learning time
- _____ e. allows the student to take a passive role
7. Write a situation for or description of a simulation, game, or roleplaying related to vocational education. Follow the characteristics listed in the table in this module.
8. Read Chapter 8, "Types of Performance," in Mager, R. F., & Beach, K. M., Jr., Developing vocational instruction. Belmont, CA: Fearon Publishers, 1967. Then answer the following multiple-choice questions by marking an "X" at the appropriate choice.

- a. Troubleshooting an inoperative IBM selectric type-writer primarily requires which type of performance?
- a. discrimination
 - b. problem-solving
 - c. recall
 - d. manipulation
 - e. speech
- b. Greeting a customer in an appropriate manner primarily requires which type of performance?
- a. discrimination
 - b. problem-solving
 - c. recall
 - d. manipulation
 - e. speech
- c. Recognizing when a customer is in an angry mood primarily requires which type of performance?
- a. discrimination
 - b. problem-solving
 - c. recall
 - d. manipulation
 - e. speech
- d. Repairing a leaky faucet primarily requires which type of performance?
- a. discrimination
 - b. problem-solving
 - c. recall
 - d. manipulation
 - e. speech

e. Knowing the correct type of plow to use in very wet soil primarily requires which type of performance?

- a. discrimination
- b. problem-solving
- c. recall
- d. manipulation
- e. speech

f. Identifying the appropriate table appointments to use when setting a table for a formal five-course dinner for eight primarily requires which type of performance?

- a. discrimination
- b. problem-solving
- c. recall
- d. manipulation
- e. speech

g. Determining when a piece of unfinished walnut has been sanded sufficiently primarily requires which type of performance?

- a. discrimination
- b. problem-solving
- c. recall
- d. manipulation
- e. speech

h. If you wanted students to obtain basic knowledge about the primary functions of the human body, what would be the most appropriate teaching method?

- a. group discussion
- b. programmed instruction
- c. demonstration
- d. roleplaying

- 7
- i. If you wanted students to develop positive safety attitudes in the shop, what would be the most appropriate teaching method?
- a. programmed instruction
 - b. case problems
 - c. roleplaying
 - d. lecture
- j. If you wanted students to learn how to operate an electric proportional spacing typewriter, what would be the most appropriate teaching method?
- a. practice and drill
 - b. group discussion
 - c. simulated performance
 - d. reading assignment
- k. If you wanted students to learn the parts of an automobile engine, what would be the most appropriate teaching method?
- a. on-the-job training
 - b. case problems
 - c. guest speakers
 - d. programmed instruction

Group Activities

1. This activity involves a brainstorming group in which the topic "The Use of Small-Group Discussions in Vocational Classes" is considered. Learners should break into groups of approximately six individuals, with each group selecting one person to be the leader and one person to be the recorder. The leader's role will be to ensure that all members participate and to encourage the sharing of all constructive ideas. The recorder will test each idea or statement.

Analyze:

- What characteristics did this teacher have?
 - What improvements could be made on what you observed in the teaching-learning laboratory, activities, etc.?
 - Were there other factors that contributed to the effectiveness of the laboratory experience?
 - How could the laboratory activity have been presented more effectively?
 - What features were innovative and/or creative, and how can these be used in your field?
 - Did the activity observed truly lend itself to the strategy?
3. In small groups brainstorm a list of topics in vocational education that seem appropriate for the inquiry method. Then develop a list of advantages and disadvantages of this method. Compare lists after the brainstorming activity.

GOAL 2

GOAL 2; Develop an evaluation plan for assessing student achievement of instructional objectives.

Assessing Student Achievement of
Instructional Objectives--Criterion-Referenced Testing

Various authors have defined the term "criterion-referenced testing." Let's examine some of those definitions now.

According to Mager and Beach (1967), a criterion test "determines how well the student's performance at the end of instruction coincides with the performance called for in the objectives."

According to Butler (1972), the criterion test "measures the individual's proficiency against a predetermined set of absolute criteria. Its main purpose is to determine as accurately as possible when a student has reached the acceptable level of performance."

According to Goldstein (1974), "Criterion-referenced measures provide a standard of achievement for the individual as compared with specific behavioral objectives and therefore provide an indication of the degree of competence attained by the trainee."

In other words, a test that measures a student's achievement of an instructional objective is "criterion-referenced." According to the type of learning being assessed, various test instruments or techniques are used.

Assessment Techniques for the Cognitive Domain

The following techniques are appropriate for assessing student achievement of instructional objectives concerned with course content and factual information:

- Noting written or oral responses to selected questions or issues listed in a pretest or an exit test

- Using teacher-made written tests consisting of objectively scorable questions
- Having students prepare a short paper or essay with standards and criteria for assessment
- Having a student chair or serve as a member of a committee, preparing and presenting a report on some aspect of a unit of instruction
- Assessing a student's response to questions raised by an instructor in a group instruction review

Assessment Techniques for the Affective Domain

People have attempted to measure attitudes for years and have developed very complex assessment procedures that have had only minimal success. Teacher observation and teacher judgment are often used to measure affective behavior. Teacher observation is the systematic categorization of student behavior under consideration. Teacher judgment can be utilized if the teacher constructs a rating scale or a checklist to be used in determining if the behaviors under consideration are being exhibited according to a given set of criteria. However, subjectivity frequently biases results based on teacher observation and judgment.

Assessment Techniques for the Psychomotor Domain

Measuring instruments that are available in the psychomotor domain include observation systems, rating scales, and checklists. The following techniques are appropriate for assessing student achievement of instructional objectives concerned with motor skills:

- Observing the student as he or she demonstrates a skill or the application of knowledge
- Assessing a finished product that required the use of the psychomotor skills being assessed
- Using a performance test in which the student demonstrates the psychomotor ability as part of the test

Written Tests

Written tests include objective and subjective tests. Typical objective test questions include true-false, multiple choice, completion, matching, and pictorial recall. An essay test is an example of a subjective test question. Discussed below are the merits and limitations of these types of tests.

- True-False

This type of test question is generally inferior to other types, since the element of "guessing" is always present. Remember, a person who knows absolutely nothing about the subject will average 50% correct by just answering all the questions. Furthermore, educators claim that even suggesting a negative answer is a poor practice in teaching.

Advantages:

- (1) Comparatively easy to construct
- (2) May be applied to a wide range of subject matter
- (3) Objective and easy to score using a key
- (4) Permits a wide sampling of knowledge in a unit of work

Disadvantages:

- (1) Includes negative suggestion
- (2) Guessing factor is 50-50

- Multiple Choice

In this type of test question the student must select the most appropriate answer from a minimum of four possible answers. Care should be taken to avoid more than one most appropriate answer.

Advantages:

- (1) Tests students' judgment, reasoning, and discrimination abilities
- (2) Tests more than memory for factual knowledge (tests by recognition rather than recall)

(3) Very adaptable to who, what, when, and where situations

(4) Reduces guessing factor from one-half to one-quarter

Disadvantages:

(1) Initial construction of multiple choice items is time consuming, but this factor is offset by usefulness of questions

● Completion

This type of test question requires students to supply the answer to an incomplete statement or question by recalling one or two words, numbers, dates, or symbols. This type of testing requires that the student supply the exact answer intended.

Advantages:

- (1) Tests memory
- (2) Stimulates study habits
- (3) Eliminates guessing

Disadvantages:

- (1) More difficult to score
- (2) Measures only factual knowledge

● Matching

A matching test question is one that consists of matching words in one column with a closely related word or words in scrambled order in a second column. If for no other reason, this type of question is used to add a certain amount of variety and interest to the otherwise boring task of taking a test.

Advantages:

- (1) Comparatively easy to construct
- (2) Objective and easy to score
- (3) Efficient as a space- and time-saver

- (4) When properly constructed, the guessing factor can be practically eliminated

Disadvantages:

- (1) Inferior to multiple choice items for measuring judgment and application--apt to stress memorization of facts
- (2) Unless properly constructed, may include irrelevant clues to correct response
- (3) Unless skillfully prepared, may be time consuming for student

- Pictorial Recall

Identification test questions, in which various parts of a drawing are to be identified, not only have an interest value but are also quite effective for testing nomenclature for tasks, tools, materials, and parts of objects.

Advantages:

- (1) Tests memory
- (2) Stimulates study habits
- (3) Eliminates guessing
- (4) Easy to score

Disadvantages:

- (1) Measures only factual knowledge

- Essay Questions

Essay questions are fairly easy to prepare and are adaptable to most subjects and most classroom conditions. The chief disadvantage is that they are hard to score fairly. This is because scoring is based chiefly on opinion, which may be influenced by neatness, "literary" ability rather than subject matter expertise, or personality conflicts between the student and instructor.

Advantages:

- (1) Measures students' ability to organize their thoughts and to express themselves clearly
- (2) Takes a comparatively short time to prepare

Disadvantages:

- (1) Time consuming to score
- (2) Difficult to score objectively
- (3) Time consuming for student to write
- (4) Penalizes students who are unable to express themselves well
- (5) Lacks reliability

Performance Tests

A performance test requires students to accomplish a job-like task under conditions that will give students the best possible chance to display the skill being measured, and under conditions that do not change from one student to another. Performance tests are used to determine whether students can perform the correct process and produce the correct product.

Process evaluations require instructors to observe students as they complete a process. At this time, the instructor can observe the process and also determine whether the product has been completed correctly. Since process evaluation must take place on a one-to-one basis, it presents certain difficulties for the instructor, who cannot be responsive to other students in the class at the time of the evaluation.

Product evaluation is used when the instructor is primarily interested in whether the student can produce the correct product. It doesn't allow the instructor to assess the process that created the product--that is, the correct product may be completed by a correct or an incorrect process. It does, however, free the instructor to evaluate the performance of students after class or during periods when students do not require assistance.

Basic procedures for developing a performance evaluation instrument are listed below:

- Specify the objective.
- Determine if you want to evaluate the performance with a performance test or a product evaluation.
- If a performance test is used, list the procedural steps. If a product evaluation is used, list the points to be observed after the performance is completed. Make sure that the steps or points are independent, that each contains only one performance, that each begins with a verb indicating the behavior expected of the student, and that all steps are listed.
- Identify critical items.
- Determine if you need instructor checkpoints when using a product evaluation.
- Determine the criteria for judging satisfactory completion of each step.
- Establish the acceptable mastery level score for the instrument.

Good Tests

A test is good because it accomplishes its purpose effectively and economically in a particular situation. A good test is one that is objective, valid, reliable, efficient, and non-reactive. Analyze these qualities carefully.

Objective. Objective tests are those that yield similar scores no matter who is doing the scoring. In general, paper-and-pencil tests, checklists, and rating scales are more objective than performance tests and observations. It is necessary to establish scoring rules that facilitate clear assignment of scores to each response. For a less objective test (e.g., an essay), this may require developing a key that gives scoring rules and examples of typical responses and their proper scores. Objectivity, therefore, applies to the giving and scoring of a test and not to the person taking the test.

Valid. Valid tests are those that are closely related to and broadly representative of the outcome being measured. Measurement techniques that are relatively objective and reliable also tend to be relatively valid. However, additional assurance of a measure's validity is obtained by constructing a logical

rationale for each measure used (to see better its relationship with the desired outcome) and by providing sufficient measures of each important outcome. If several independent measures of the same outcome produce highly similar results, the measures are likely to be acceptably valid.

Reliable. Reliable measures are those that yield constant scores relatively free from chance variation over time. To improve reliability, it is important that instructions and testing conditions be the same for all persons; that practice, or sample items, be given if possible to avoid effects from unfamiliarity with the type of measure being used; and that several measures for the same objective be used rather than one.

Efficient. Efficient measures are those that yield reliable and valid scores at a low cost in terms of money, personnel, and time. In general, this means that the measures can be administered to groups on a single occasion and under normal rather than contrived circumstances (e.g., an ordinary classroom setting). Measures that can be scored and processed quickly and easily are more efficient than those requiring more time and expertise.

Non-reactive. A non-reactive measure is one that does not unduly influence the behavior of the person to whom it is being applied. Relatively non-reactive measures include routinely collected records and observations--for example, observations of the frequency of certain behaviors.

Individual Study Activities

1. Write your definition of the concept of "criterion-referenced testing."
2. Complete the following multiple-choice questions by marking an "X" by the specific learning domain being tested by the assessment technique described.
 - a. As part of a performance test, an instructor observes a student to determine whether or not he is able to operate a power saw following correct procedures.
 a. cognitive domain
 b. affective domain
 c. psychomotor domain
 - b. A teacher prepares a series of multiple-choice questions to test the student's knowledge of the various types and uses of power saws.
 a. cognitive domain
 b. affective domain
 c. psychomotor domain
 - c. With a list of characteristics that describe a safety conscious individual, an instructor observes a group of students working in a wood shop to determine whether these students are safety-conscious.
 a. cognitive domain
 b. affective domain
 c. psychomotor domain
 - d. As part of a performance test, an instructor observes a group of retail sales trainees in a roleplaying session to determine whether they are able to establish good rapport with customers.
 a. cognitive domain
 b. affective domain
 c. psychomotor domain

- e. An instructor selects a standardized test consisting of matching items that determines whether or not dental assisting students are able to identify basic tools used by the dentist.
- a. cognitive domain
 - b. affective domain
 - c. psychomotor domain
3. Read pp. 40-43 ("Criterion Examination") in Mager, R. F., & Beach, K. M., Jr. Developing vocational instruction. Belmont, CA: Fearon Publishers, 1967. Then complete the following activity.

For each of the objectives provided in this exercise, there is a list of possible test items. Indicate by writing "yes" or "no" whether or not that test item is appropriate for assessing the objective.

- a. OBJECTIVE: When approached by a prospective customer, respond in a positive manner (with a smile, a suitable greeting, and pleasant tone of voice).
 - a. Describe the three basic characteristics of a positive response to the approach of a prospective customer.
 - b. Look at the following ten photographs and write the number of those that represent a correct response to the approach of a prospective customer.
 - c. Watch the following ten film clips and write down the number of those that represent a correct response to the approach of a prospective customer.
 - d. When the instructor hangs the "customer" sign around his neck and approaches you, make the correct response to the approach of a prospective customer.
 - e. Write a paragraph describing the importance of each element of the response to customer approach.
 - f. When approached by each of five students selected by the instructor, make the appropriate response to customer approach.

- b. OBJECTIVE: Be able to type a business letter in accordance with standards described in Company Manual 12-21.
- ___ a. Describe the five basic elements of a business letter.
 - ___ b. Sort the ten sample letters into piles representing those that are written in accordance with company standards and those that are not.
 - ___ c. On the five sample letters given, circle any errors or items not in accordance with company standards.
 - ___ d. Describe in a paragraph the rationale for the business letter standards currently in effect.
 - ___ e. From the rough copy given, type a business letter in the form set out by Manual 12-21.
 - ___ f. Tell how you would instruct a secretary in the preparation of business letters according to current policy.

- c. OBJECTIVE: Be able to read a domestic electric power meter correctly to the nearest unit and record it on the appropriate page of the Meter-Reader's log.

- ___ a. Define kilowatt-hour.
- ___ b. Of the five dials on the domestic meter, which records "thousands of units"?
- ___ c. Look at this picture of a dial. What is the reading?
- ___ d. Look at the dials on these domestic meters. What are the readings?
- ___ e. Record on the appropriate page of your log the readings of each of these ten domestic meters.

- d. OBJECTIVE: Be able to construct a parallelogram.
- ___ a. Define parallelogram.
 - ___ b. Describe the difference between a parallelogram and a rectangle.

- c. Look at the following figures and draw a circle around the parallelograms.
- d. Draw a parallelogram whose sides are 1" and 3" in length.

Discussion Questions

1. What advantages, limitations, and/or pitfalls do you see in the position that teachers must specify and measure all instructional objectives?
2. Many educators acknowledge that affective objectives and their measurement have not received adequate emphasis in the curriculum, particularly the vocational curriculum. How do you account for this?
3. Discuss the relation of performance tests to written tests. When might a written test be considered a performance test? Many instructors speak of written tests and performance tests as if they were separate and distinct types. Written tests are often considered poor measures of proficiency, while performance tests are thought to constitute the only real measures of performance. Is this necessarily true?

Group Activities

1. Students should group themselves into two teams to debate whether instructors or curriculum specialists can more effectively acquire a set of measurable and appropriate objectives with corresponding test items by generating their own or by selecting them from other sources.

Consider such practical matters as:

Are other sources of measurable objectives with corresponding test items available? If so, are these objectives and test items suitable for the local situation?

Are instructors or curriculum specialists likely to have time to generate their own objectives and test items? If not, is it possible that a local curriculum team might effectively function to develop objectives and test items?

2. Students should break into small groups, each group selecting a learning module (teacher-made or commercial) that may be available in the classroom. Students should

analyze the module for match of objectives and test items. Based on how well objectives and test items match, students should determine whether they would recommend the module for further use.

3. It is possible that someday, upon designation of instructional objectives, a computer could devise an evaluation plan, select test items from a test-item pool, print the test, score and grade it, and analyze the results. What do you see as the possible advantages and disadvantages of such a criterion-referenced measurement system? Debate the issue.

Summary

In Goal 1 of this module, you reviewed the characteristics of the ten instructional strategies listed below:

- Lecture
- Discussion techniques
- Demonstrations
- Laboratory method
- Questioning techniques
- Inquiry
- Simulation, games, and roleplaying
- Individualized instruction
- Field experiences

You were also introduced to criteria you might use to select an appropriate strategy for accomplishing specific instructional objectives.

In Goal 2, you learned about criterion-referenced testing in the cognitive, affective, and psychomotor domains. You were introduced to the advantages and disadvantages of the testing methods listed below:

- True-false tests
- Multiple choice tests
- Completion tests
- Matching tests
- Pictorial recall tests
- Essay tests
- Performance tests

You also learned that a good test should be objective, valid, reliable, efficient, and non-reactive.

APPENDICES

Individual Study Activity Responses

GOAL 1

1. The response to this activity will depend on your personal experiences.
2.
 - a. Brainstorming
 - b. Tutorial
 - c. Discursive
 - d. Didactic
 - e. Tutorial
 - f. Phillips 66
 - g. Socratic
 - h. Buzz
 - i. Brainstorming
 - j. Task
 - k. Discursive
 - l. Buzz
 - m. Phillips 66
 - n. Tutorial
3. b
4. b
5.
 - a. D
 - b. C
 - c. D
 - d. E
 - e. D
 - f. C

- g. D
 - h. D
 - i. E
 - j. D
6. b
7. The following are suggestions only. They are provided as guidelines for developing your own simulation, game, and roleplaying situations.

I. Simulation

Place: Personnel Office (simulated)

People involved: A personnel manager and prospective employee

Situation: The student is interviewing for a position in the company

- Objectives:
- A. Students will be able to demonstrate their knowledge of proper interview techniques.
 - B. Students will be able to develop their personal skills of talking with a prospective employer.
 - C. Students will be able to develop confidence in themselves.

II. Games

There are numerous commercially prepared educational games that could be adapted to vocational education. The important facts are that there are specific rules to be followed, and there is usually a winner. Points are usually given as an incentive to become the winner.

III. Roleplaying

Situation: A mother trying to buy a shirt for her son on a Saturday afternoon at a local department store

Procedure: Three students are selected. They are handed a card that displays the type of person they should try to become. Only the student playing the role knows what is on the card.

People involved and roles:

Salesperson - A man about 25-30, married, and has worked at this store for one year. He is trying to please both sides.

Mother - A very interesting individual. She is always looking for a durable product but at bargain prices.

Son - He is about 17, varsity basketball player, likes to be stylish and attractive to the opposite sex. Does not like the color or style of the shirt.

Objective: The student will be able to identify the problems associated with a particular situation and describe how he or she would have handled the same problem.

8. a. (b)
- b. (e)
- c. (a)
- d. (d)
- e. (c)
- f. (c)
- g. (a)
- h. (b)
- i. (c)
- j. (a)
- k. (d)

GOAL 2

1. Criterion-referenced testing is a form of educational measurement that ascertains an individual's status with respect to some criterion or performance standard. Because the individual is compared with some established criterion, rather than with other individuals, these measures are described as criterion-referenced.

2. a. c

b. a

c. b

d. b

e. a

3. a. a. no

b. no

c. no

d. yes

e. no

f. yes

b. a. no

b. no

c. no

d. no

e. yes

f. no

c. a. no

b. no

c. no

d. no

e. yes

- d. a. no
- b. no
- c. (no
- d. yes

5

Self-Check

GOAL 1

1. Through the use of lectures, the instructor is able to:
 - a. repeat and summarize important ideas
 - b. save teacher time and learner time
 - c. provide instruction to many students at one time
 - d. meet the individual needs of class members

2. Of the following discussion types, which one requires free and uninhibited discussion by students on a topic that they select?
 - a. task group
 - b. didactic group
 - c. discursive group
 - d. socratic group

3. Criteria used in the selection of the demonstration method as a teaching technique are:
 - a. inexpensive, interesting, and easy to prepare
 - b. effectiveness, involves two or more senses, and adaptability
 - c. efficiency, adaptability, and used for large groups
 - d. involves two or more senses, interesting, and requires much preparation

4. The vocational education laboratory can best be described as a means of:
 - a. exploring student attitudes toward work
 - b. teaching an occupational skill
 - c. working with practical application of principles
 - d. deriving formulas theoretically

5. When an instructor wants to elicit a number of different responses, the best questioning technique is which of the following?

- a. divergent
- b. convergent
- c. echo
- d. whiplash
- e. scatter

6. Pick the true statements about the inquiry strategy.

1. Slower students are often confused by attempting to deal with divergent thinking and abstract concepts.
2. The method is especially effective in teaching large numbers of students.
3. It helps students learn how to learn.
4. Inquiry sessions may be monopolized by students who are more intellectually able.

- a. 1, 2, 3, 4
- b. 2, 3, 4
- c. 1, 3, 4
- d. 1, 2, 3
- e. 1, 2, 4

7. Simulations can be used to:

- a. create student interest in learning
- b. look at selected controlled situations
- c. involve students in potentially threatening situations without danger to them
- d. all of the above

8. During the prescriptive stage of an individualized instruction program, the teacher:
- a. tells the student which of the learning activities are best suited for him or her
 - b. determines what times of the day the student is most alert
 - c. explains learning alternatives available to the student
 - d. asks the student to complete a questionnaire to determine motivation
 - e. tests the student for his or her entry skill
9. A field experience program in which students work for pay as producing employees with no related classroom instruction and limited school supervision is known as:
- a. diversified or multi-occupations
 - b. paid work experience
 - c. cooperative vocational education
 - d. apprenticeship
 - e. work observation
10. Which of the following best describes independent study?
- a. costly administration
 - b. individualized instruction
 - c. preliminary group experiences
 - d. programmed instruction

GOAL 2

1. What is the definition of criterion-referenced testing?
- a. The determination of the worth of educational phenomena; the term generally refers to the evaluation of an education enterprise, such as an instructional sequence, not to the evaluation of students within that enterprise.

- b. A form of educational measurement that ascertains an individual's status with respect to some criterion or performance standard.
 - c. The assessment of the current status of an educational phenomenon in a precise fashion--that is, counting or enumerating so that the phenomenon can be more accurately described--without placing value (goodness or badness) on the phenomenon thus described.
 - d. A form of educational measurement that ascertains an individual's performance in relationship to the performance of other individuals on the same measuring device.
2. As part of a performance test, an instructor observes a student to determine whether he is able to clean and make a hospital bed, following correct hospital procedure. What learning domain is this technique primarily assessing?
- a. psychomotor domain
 - b. cognitive domain
 - c. affective domain
3. Which of the following test items is appropriate for assessing this objective: Be able to recognize when a torch flame is appropriate for cutting half-inch steel?
- a. Describe the characteristics of a torch flame that is appropriate for cutting half-inch steel.
 - b. Look at the following eight color slides of good and bad flames and write the number of those appropriate for cutting half-inch steel.
 - c. Given a welding torch, adjust the flame until it is appropriate for cutting half-inch steel.
 - d. Tell how you would adjust the flame of a welding torch to make it appropriate for cutting half-inch steel.

Self-Check Responses

GOAL 1

1. b
2. c
3. b
4. c
5. a
6. c
7. d
8. c
9. b
10. b

GOAL 2

1. b
2. a
3. b

(NOTE: Although the actual flame is probably more relevant for testing than color slides, it is less practical for discrimination training since it would take the instructor considerable time to misadjust a flame to present the student with a predesigned array of stimuli.)

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VECS Module Titles

- Module 1: Vocational Educators and Curriculum Management
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- Module 4: Legislative Mandates for Vocational Education
- Module 5: Priorities in Vocational Education
- Module 6: Vocational Education for Students with Special Needs
- Module 7: Vocational Needs Assessment and Curriculum Development
- Module 8: Conducting Task Analyses and Developing Instructional Objectives
- Module 9: Selecting Instructional Strategies and Assessing Student Achievement
- Module 10: Relating Learning Differences and Instructional Methods
- Module 11: Selecting and Preparing Instructional Materials
- Module 12: Evaluating Vocational Education Curricula
- Module 13: Conducting Follow-Up Studies and Communicating Evaluation Results
- Module 14: Managing Vocational Education Programs
- Module 15: Preparing for Curriculum Change
- Module 16: Staff Development