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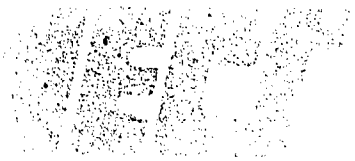
ABSTRACT

One of 15 core modules in a 22-module series designed to train vocational education curriculum specialists (VECS), this guide is intended for use by both instructor and student in a variety of education environments, including independent study, team teaching, seminars, and workshops, as well as in more conventional classroom settings. The guide has five major sections. Part I, Organization and Administration, contains an overview and rationale, educational goals and performance objectives, recommended learning materials, and suggested reference materials. Part II, Content and Study Activities, contains the content outline arranged by goals. Study activities for each goal and its corresponding objectives follow each section of the content outline. Content focus is on influences affecting vocational education objectives and how they are determined at the classroom level; classroom conditions that support each type of learning outcome; course planning to establish learning conditions; and delivery of instruction to meet individual needs (assumptions underlying group instruction and individualizing vocational education). Part III, Group and Classroom Activities, suggests classroom or group activities and discussions keyed to specific content in the outline and to specific materials in the list of references. Part IV, Student Self-Check, contains questions directly related to the goals and objectives of the module, which may be used as a pretest or posttest. Part V, Appendix, contains suggested responses to the study activities from part II and responses to the student self-checks. (HD)



-Study Guide-

Module 3

APPLYING KNOWLEDGE OF LEARNING PROCESSES AND OUTCOMES TO INSTRUCTION

This document is one of a series of teaching/learning modules designed to train Vocational Education Curriculum Specialists. The titles of all individually available documents in this series appear below:

INTRODUCTORY MODULES

1. The Scope of Vocational Education
2. Roles of Vocational Educators in Curriculum Management
3. Current Trends in Vocational Education
4. Organization of Vocational Education
5. Legislative Mandates for Vocational Education
6. The Preparation of Vocational Educators

CORE MODULES

1. Important Differences Among Learners
2. Learning Processes and Outcomes
3. Applying Knowledge of Learning Processes and Outcomes to Instruction
4. Assessing Manpower Needs and Supply in Vocational Education
5. Laying the Groundwork for Vocational Education Curriculum Design
6. Selecting Instructional Strategies for Vocational Education
7. Derivation and Specification of Instructional Objectives
8. Development of Instructional Materials
9. Testing Instructional Objectives
10. Fiscal Management of Vocational Education Programs
11. Introducing and Maintaining Innovation
12. Managing Vocational Education Programs
13. Basic Concepts in Educational Evaluation
14. General Methods and Techniques of Educational Evaluation
15. Procedures for Conducting Evaluations of Vocational Education

SEMINARS AND FIELD EXPERIENCE MODULE

(Seminars in Authority Roles and the Curriculum Specialist in Vocational Education, and Leadership Styles and Functions of the Curriculum Specialist in Vocational Education; field work in Project Design and Administration, Operation of School Programs, Evaluation of School Programs, Educational Research and Development, and State, Regional, and Federal Program Supervision)

INSTALLATION GUIDE

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PREFACE

Who is a vocational education curriculum specialist? The answer to this question is not as simple as it might appear. A vocational education curriculum specialist is likely to work in many different capacities, including, but not limited to: instructor, department chairperson, dean of vocational-technical education, vocational supervisor, principal, state or local director of vocational education, and curriculum coordinator.

The specialist is, perhaps, more identifiable by his/her responsibilities, which include, but are not limited to:

- planning, organizing, actualizing, and controlling the work of an educational team performed to determine and achieve objectives.
- planning, organizing, and evaluating content and learning processes into sequential activities that facilitate the achievement of objectives.
- diagnosing present and projected training needs of business, industry, educational institutions, and the learner.
- knowing, comparing, and analyzing different theories of curriculum development, management, and evaluation and adapting them for use in vocational-technical education.

This teaching/learning module is part of a set of materials representing a comprehensive curriculum development project dealing with the training of vocational education curriculum specialists. The purpose of this two-year project was 1) to design, develop, and evaluate an advanced-level training program, with necessary instructional materials based on identified vocational education curriculum specialist competencies, and 2) to create an installation guide to assist instructors and administrators in the implementation process.

The curriculum presented here is, above all else, designed for flexible installation. These materials are not meant to be used only in the manner of an ordinary textbook. The materials can be used effectively by both instructor and student in a variety of educational environments, including independent study, team teaching, seminars, and workshops, as well as in more conventional classroom settings.

Dr. James A. Dunn
Principal Investigator and
presently Director,
Developmental Systems Group
American Institutes for Research

ACKNOWLEDGEMENTS

The Vocational Education Curriculum Specialist Project was a comprehensive development and evaluation effort involving the contribution of a large number of people: project staff, curriculum consultants, a national advisory panel, and a number of cooperating colleges and universities. This wide variety of valuable inputs makes it difficult to accurately credit ideas, techniques, suggestions, and contributions to their originators.

The members of the National Advisory Panel, listed below, were most helpful in their advice, suggestions, and criticisms.

Myron Blee	*Florida State Department of Education*
James L. Blue	*RCU Director, Olympia, Washington*
Ralph C. Bohn	*San Jose State University*
Ken Edwards	*International Brotherhood of Electrical Workers*
Mary Ellis	*President, American Vocational Association*
George McCabe	*Program Director, Consortium of California State University and Colleges*
Curtis Henson	*Atlanta Independent School District, Georgia*
Ben Hirst	*Director, Consortium of the States, Atlanta, Georgia*
Joseph Julianelle	*U. S. Department of Labor*
Lee Knack	*Industrial Relations Director, Morrison-Knudsen, Inc.*
Bette LaChapelle	*Wayne State University*
Jerome Moss, Jr.	*University of Minnesota*
Frank Pratzner	*CVE, Ohio State University*
Rita Richey	*Wayne State University*
Bryl R. Shoemaker	*Ohio State Department of Education*
William Stevenson	*Oklahoma State Department of Education*

The project would not have been possible without the cooperation and commitment of the field test institutions listed below.

California State University, Long Beach
California Polytechnic State University, San Luis Obispo
Consortium of California State University and Colleges
- California State University, Sacramento
- California State University, San Diego
- California State University, San Francisco
- California State University, San Jose
- California State University, Los Angeles

Iowa State University
University of California Los Angeles
University of Northern Colorado

Overall responsibility for the direction and quality of the project rested with James A. Dunn, Principal Investigator. Project management, supervision, and coordination were under the direction of John E. Bowers, Project Director.

TABLE OF CONTENTS

Part I:

Organization and Administration

PART I
ORGANIZATION AND ADMINISTRATION

Guidelines

This study guide has five major sections. Each section contains useful information, suggestions, and/or activities that assist in the achievement of the competencies of a Vocational Education Curriculum Specialist. Each major section is briefly described below.

PART I: ORGANIZATION AND ADMINISTRATION

PART I contains an Overview and Rationale, Educational Goals and Performance Objectives, Recommended Learning Materials, and Suggested Reference Materials. This section will help the user answer the following questions:

- How is the module organized?
- What is the educational purpose of the module?
- What specifically should the user learn from this module?
- What are the specific competencies emphasized in this module?
- What learning materials are necessary?
- What related reference materials would be helpful?

PART II: CONTENT AND STUDY ACTIVITIES

Part II contains the content outline arranged by goals. The outline is a synthesis of information from many sources related to the major topics (goals and objectives) of the module. Study activities for each goal and its corresponding objectives follow each section of the content outline, allowing students to complete the exercises related to Goal 1 before going on to Goal 2.

PART III: GROUP AND CLASSROOM ACTIVITIES

The "Activities-Resources" column in the content outline contains references to classroom or group activities and discussion questions related to specific content in the outline. These activities and discussion questions

are located in PART III and are for optional use of either the instructor or the student. Both the classroom activities and discussion questions are accompanied by suggested responses for use as helpful examples only--they do not represent conclusive answers to the problems and issues addressed. Also contained in the "Activities-Resources" column are the reference numbers of the resources used to develop the content outline. These reference numbers correspond to the numbers of the Suggested Reference Materials in PART I.

PART IV: STUDENT SELF-CHECK

PART IV contains questions directly related to the goals and objectives of the module. The self-check may be used as a pre-test or as a post-test, or as a periodic self-check for students in determining their own progress throughout the module.

PART V: APPENDICES

Appendix A contains responses to the Study Activities from PART II, and Appendix B contains responses to the Student Self-Check. The responses provide immediate feedback to the user and allow the module to be used more effectively for individualized study. They have been included in the last part of the module as appendices to facilitate their removal should the user wish to use them at a later time rather than concurrently with the rest of the module.

Approximately 30 hours of out-of-class study will be necessary to complete this module.

Overview and Rationale

In this module, the knowledge of learning processes and outcomes presented in Module 2: Learning Processes and Outcomes is applied directly to vocational instruction. Such application involves the specification of performance objectives, the identification of conditions necessary to reach the objectives, and the planning and delivering of instruction so as to make sure that these necessary conditions are realized.

The module begins by treating the factors that influence objectives in vocational education and examining how they exert their influence. These factors include state and national priorities, as well as manpower needs and local pressures. Their influence is felt not only by teachers and students at the classroom level, but also by administrators, counselors, school board members, and others.

Next, the module discusses performance objectives at the classroom level and examines the conditions that must be established to ensure that these objectives are reached, including a consideration of the special demands made by each type of learning outcome. The discussion also touches on the actual writing of performance objectives. Students are asked to write objectives at this point in order to set the stage for the planning of instruction that allows objectives to be reached. However, the development of finely honed skills in objective writing is not the object of this module. For a more detailed treatment of the technology of objective writing, see Module 7: Derivation and Specification of Instructional Objectives.

Next, the discussion turns to two aspects of course planning: identifying the skills and knowledge that are prerequisites to attaining objectives; and effectively planning a lesson so that students achieve the objectives of that lesson.

Finally, the module discusses the problem of delivering instruction in a way that meets the needs of individual students in vocational classes. The emphasis in this section is on practical ways to individualize instruction.

Goals and Objectives

Upon completion of this module, the student will be able to achieve the following goals and objectives:

GOAL 3.1: KNOW WHAT FACTORS AFFECT THE GOALS AND OBJECTIVES OF VOCATIONAL EDUCATION PROGRAMS, AND KNOW HOW INSTRUCTIONAL OBJECTIVES ARE DETERMINED AT THE CLASSROOM LEVEL.

Objective 3.11 Specify how the following factors help determine program objectives in vocational education: national priorities, state priorities, manpower needs, institutional goals.

Objective 3.12 Specify how the following factors determine instructional objectives at the classroom level in vocational education: program objectives, teacher, students, parents, advisory committee.

GOAL 3.2: KNOW WHAT CONDITIONS MUST BE ESTABLISHED IN THE CLASSROOM TO SUPPORT VARIOUS LEARNING OUTCOMES.

Objective 3.21 Specify the characteristics of a good performance objective.

Objective 3.22 Write a good performance objective for each type of learning outcome for use in a vocational course.

Objective 3.23 Specify the conditions of learning that best support each type of learning outcome; illustrate with examples from vocational education.

GOAL 3.3: KNOW HOW TO PLAN INSTRUCTION IN ORDER TO ESTABLISH THE CONDITIONS NECESSARY FOR LEARNING.

Objective 3.31 Describe the following aspects of course planning: identification of multiple learning goals, arrangement of sequences of prerequisites,

Objective 3.32 Explain how each aspect of course planning influences course structure in vocational education.

Objective 3.33 Describe the events in a lesson; relate each to the appropriate learning step.

Objective 3.34 Show, by example, how to plan for each event in a lesson in a vocational class.

GOAL 3.4: KNOW HOW TO DELIVER INSTRUCTION TO MEET INDIVIDUAL NEEDS.

Objective 3.41 List assumptions that underlie group instruction; evaluate the validity of these assumptions.

Objective 3.42 Show, by example, how vocational instruction can be individualized.

Objective 3.43 Show, by example, how tutorial instruction and self-instruction can be realized in vocational education.

Recommended Materials

1. Law, Gordon F. "Teaching Strategies for Individual Learning." In The Individual and His Education, edited by Alfred H. Krebs. Second Yearbook of the American Vocational Association. Washington, D.C.: AVA, 1972.

2. Gagné, Robert M. Essentials of Learning for Instruction. Hinsdale, Illinois: The Dryden Press, 1974.

3. Strong, Merle E. "Performance Objectives in Vocational Education." In The Individual and His Education, edited by Alfred H. Krebs. Second Yearbook of the American Vocational Association. Washington, D.C.: AVA, 1972.

Suggested References

1. Butler, F. C. Instructional Systems Development for Vocational and Technical Training. Englewood Cliffs, New Jersey: Educational Technology Publications, 1972.

2. Gagné, R. M. Essentials of Learning for Instruction. Hinsdale, Illinois: The Dryden Press, 1974.

3. _____, and Briggs, L. J. Principles of Instructional Design. New York: Holt, Rinehart and Winston, Inc., 1974.

4. Kapfer, M. B., ed. Behavioral Objectives in Curriculum Development. Englewood Cliffs, New Jersey: Educational Technology Publications, 1971.

5. Krebs, A. H., and Krebs, J. E. "Learning About the Individual Vocational Student." In The Individual and His Education, edited by A. H. Krebs. Washington, D.C.: The American Vocational Association, 1972.

6. Law, G. F. "Teaching Strategies for Individual Learning." In The Individual and His Education, edited by A. H. Krebs. Washington, D.C.: The American Vocational Association, 1972.

7. Strong, M. D. "Performance Objectives in Vocational Education." In The Individual and His Education, edited by A. H. Krebs. Washington, D.C.: The American Vocational Association, 1972.

(NOTE: The reading materials required for use with this module contain a wealth of up-to-date resources for further reading and study. The "General References" suggested at the end of each of Gagné's chapters are particularly rich resources for psychology and education. Law and Strong, in their more specialized domains, also provide excellent lists of references.)

Part II:

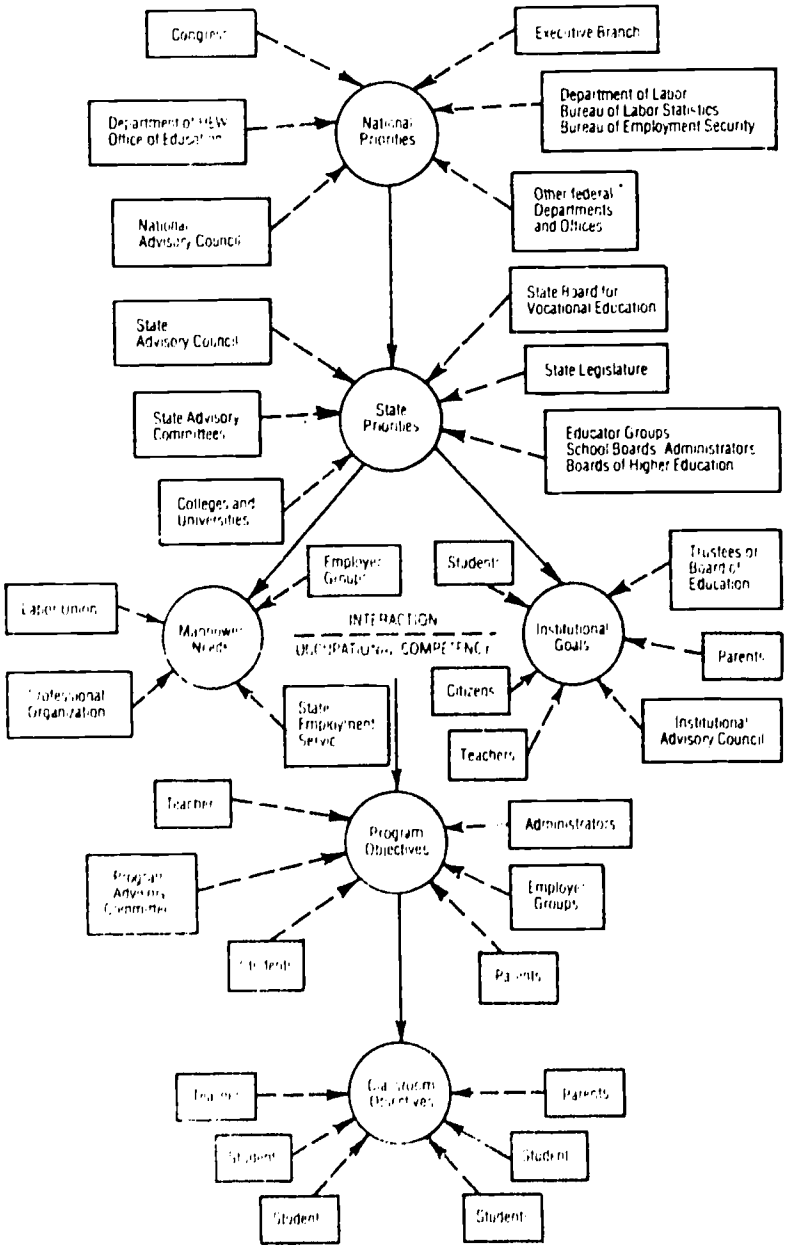
Content and Study Activities

PART II
CONTENT AND STUDY ACTIVITIES

Goal 3.1

Content Outline	Activities-Resources
Goal 3.1: Know what Influences Affect the Goals and Objectives of Vocational Education Programs, and Know How Instructional Objectives are Determined at the Classroom level.	
(NOTE: In this module, the terms "behavioral objective," "performance objective," "instructional objective," and "learning objective" will be considered synonymous.)	
A. Sources of Objectives: An Overview (7)	
1. Performance objectives are influenced by a variety of forces. Almost all these forces are illustrated in Strong's model (shown on following page). Since this diagram will be referred to frequently throughout the balance of this section, some terminological conventions must be established to avoid confusion. Therefore:	
a. Factors are those entities (in circles) that are developed as a result of agents acting upon them.	
b. Agents are those entities (in boxes) that influence a factor in the diagram.	(7) "Performance Objectives in Vocational Education."

PERFORMANCE OBJECTIVES IN VOCATIONAL EDUCATION—A MODEL *



* From Strong, M. E. "Performance Objectives in Vocational Education." In The Individual and His Education, edited by A. H. Krebs. Washington, D.C.: The American Vocational Association, 1972.

2. While all factors shown in Strong's model influence classroom objectives for the student either directly or indirectly, most of them also set (or influence) objectives for persons other than students.*

B. Objectives at the Classroom Level

1. While all factors that influence vocational education have an impact on classroom objectives, the most direct influence, according to Strong's model, is exerted by program objectives, teachers, students, and parents. Note that other important influences such as the job market, labor unions, school administrators, and state and national policy have not been neglected. Rather, they have helped shape the program objectives and, therefore, exert their influence through that factor. The main way in which this influence is felt is through the advisory committees that are established by all first-rate vocational programs.
2. The program objectives establish the range of acceptable classroom objectives. According to the program objectives, the student should emerge from the course with certain capabilities, so classroom objectives must be chosen that help students reach those objectives.
3. Within the limits set by the program objectives, the classroom objectives are selected by the teacher, students, and parents. The role played by each of these in selection will

* See Discussion Questions A, B, and C in Part III.

vary with educational philosophy, course content, and sophistication of the parties.

a. The instructor will, of course, have the final say; he is the expert and knows what skills and knowledge must be acquired.

b. A good instructor, however, will be sensitive and alter his approach if he is not getting through.

c. Thus, parents through students will influence methods and topics for the sensitive instructor, even if it is impractical to allow them to choose the content to be included.*

* See Discussion Question D in Part III.

C. Importance of Objectives*

* Students should complete Classroom Activity 1 which relates to Objective 3.12. See Part III.

1. Objectives that specify performance requirements are important at any level of an educational system. Objectives serve to:
   a. clarify what a system is to achieve and how it is to achieve it;
   b. specify the duties of each person or component;
   c. provide a basis for evaluating performance and for making modifications.
2. In the classroom, objectives are particularly important both for assessing student progress and for evaluating the instructional approach.
3. For the student, classroom objectives serve to:
   a. clarify the end result of his efforts;
   b. specify clearly what is expected;
   c. provide a standard against which to judge his efforts;

d. provide reinforcement and a sense of accomplishment as each is reached.

4. For the teacher, classroom objectives are useful both for helping individual students and for planning and evaluating instruction. In assisting individual students, clearly formulated classroom objectives serve to:

   a. clarify the importance of each learning task;

   b. provide a definite standard of performance so that necessary improvements can be clearly specified for the student;

   c. provide natural points at which to reinforce the student when each step is completed.*

* See Discussion Question E in Part III.

D. Study Activities

Based on your reading of the content outline, the information provided with the learning activities, and the recommended learning materials, complete the activities on the following pages.

1. Explain in a sentence or two how each of the following factors can influence program objectives in vocational education. (These influences may be direct or indirect.)

   (NOTE: You may find the answers suggested in the "Responses to Study Activities" section of this guide useful in formulating your answers. However, if you do look at the suggested answers to get you started, do not copy them--expand on them.)

   a. National priorities:
   b. State priorities:
   c. Manpower needs:
   d. Institutional goals:

2. Complete the table below by listing three or four objectives that govern the program in which you teach and indicate how each of these objectives is influenced by national and state priorities, manpower needs, and/or institutional goals. (If you are not teaching, perform this task for a program with which you are familiar.)

Program Objective	Influences Helping to Determine Objective
Sample: To provide training for minority students previously not well served.	Sample: This objective is affected by national and state priorities regarding affirmative action, which have altered manpower needs. (Since employers wish to hire minorities to reach affirmative action goals, educational institutions have been led to emphasize service to minority group members.)

3. This exercise goes beyond the objective as stated. Nonetheless, it is valuable for helping you see the relationship among the various factors that influence objectives and among the persons and groups influenced. The term "objective" is used here in a much looser sense than it was in Activities 1 and 2.

   Complete the table on the following page for each of the factors identified by Strong. When complete, the table should show how each factor can influence objectives for persons or agencies with different roles in vocational education. Among the persons or agencies whose objectives will be influenced are:

   a. students,
   b. teachers,
   c. counselors,
   d. administrators,
   e. school boards, and
   f. state boards of vocational education.

   Complete the table only for those cases where you clearly see a strong influence. For example, if you are a teacher, the way in which program goals influence your objectives will be very clear, whereas the way in which national priorities influence the objectives of the state board of vocational education may be less so. In cases where influences are not very clear, discuss possible connections in class with persons who fill these other roles, or with the instructor.

Factor	Influence of Factor	
	Type of Person/Group Influenced	Nature of Influence
Sample:	Sample:	Sample:
National Priorities	State Board of Vocational Education	Board endeavors to make vocational programs conform to federal standards in order to win matching funds.

4. Explain in a sentence or two how each of the following factors can influence classroom performance objectives in vocational education. (NOTE: You may wish to refer to the "Responses to Study Activities" section of this guide to spur your thinking.)

   a. Program objectives:
   b. Teacher:
   c. Students:
   d. Parents:
   e. Advisory committee:

5. Complete the table below by giving a specific example that shows how each of the factors discussed in Activity 4 can influence the selection of performance objectives in the classroom. A sample response is provided.

Factor	Influence on Selection of Performance Objectives
Sample: Students	Sample: A particular group of incoming students proved to be unusually well prepared in cleaning the wounds of suffering farm animals. Thus, after assuring himself of the competency of the students, the animal husbandry instructor eliminated objectives concerned with that topic and went on instead to more advanced competencies concerning medication, which would not normally have been included.

(See Appendix A for possible answers.)

Goal 3.2

Content Outline	Activities-Resources
Goal 3.2: Know What Conditions Must Be Established in the Classroom to Support Various Learning Outcomes.	
A. Preparing Performance Objectives (2)	(2) Essentials of Learning for Instruction, Chap. 4, pp. 71-77.
1. This section discusses the development of performance objectives as a first step in establishing the conditions necessary for learning.	
2. Gagné identifies three key characteristics of a learning (performance) objective. These are the specification of:	
a. the situation in which the student is to perform;	
b. the outcome performance that the student is to demonstrate; and	
c. the action that the student is to take to show that he is capable of the outcome performance.	
3. The distinction between the second and third of these characteristics should be kept clearly in mind.	
a. The second characteristic requires specification of the learning outcome, that is, the capability to be gained by the student. There are usually many ways in which a capability could be demonstrated.	
b. The action indicates the specific way in which the student will be required to	

demonstrate the capability in a particular situation.

c. Example: if the desired outcome performance is for a student to be able to discriminate right-handed threads from left-handed threads, then many actions would satisfy the instructor that the student could do so. Among the actions: sorting bolts with such threads into piles; correctly writing "L" or "R" under photographs of left and right-handed bolts, respectively.*

* See Discussion Questions F and G in Part III.

B. Conditions that Support Each Type of Learning Outcome (2)

(2) Essentials of Learning for Instruction, Chap. 4, pp. 77-96. See also (1) Instructional Systems Development for Vocational and Technical Training, Chaps. 2, 4.

1. Once objectives have been determined, the environmental conditions that support the learning necessary to reach each objective can be identified.

   a. Gagné discusses learning conditions in terms of learning steps. These steps are:

      (1) motivation,
      (2) apprehending,
      (3) acquisition,
      (4) retention,
      (5) recall,
      (6) generalization,
      (7) performance, and
      (8) feedback.

   b. Gagné also indicates that each class of learning outcomes has its own distinctive external conditions. That is, objectives in each class demand particularly strong support from the learning environment in

order to achieve certain steps. These distinctive external conditions are discussed in detail in the text.*

2. It is best to treat Gagné's distinctive external conditions as general principles for each type of learning outcome.
   a. General principles are valuable, but they do not give all the answers; each situation must be approached individually because there are always exceptions. The "distinctive external condition" that must be established for one particular learning outcome may well vary from those which must typically be established for outcomes of that class.
   b. In particular, a vocational instructor must be guided by the specific requirements of his subject matter, the unique needs of his students and other local factors in identifying and providing distinctive external conditions for each class of learning outcome.

* Students should complete Classroom Activity 2 which relates to Objective 3.23. See Part III.

C. Study Activities

1. What three things does Gagné identify as necessary for a complete statement of a learning objective?

2. Each of the following performance objectives is inadequate. Rewrite it so that it becomes a satisfactory objective in terms of the characteristics identified by Gagné.

   a. A student will distinguish engines that are tuned in accordance with manufacturers' specifications from those that are not and make the appropriate indication on a tag attached to each engine.

   b. Faced with the problem of doing so in electronics class, the student will show that he has devised a method for determining the impedence of any given ac circuit.

   c. Given the problem: "Explain why sugar leads to increased tooth decay," the student will write a clear and accurate explanation.

3. In completing Module 2, you listed both capabilities that a student might gain in a class in your area of expertise and the behaviors that would indicate these capabilities. Now write a performance objective for each capability, being sure to specify which part of each objective is the situation, the outcome performance, and the action.

4. List the critical learning conditions that Gagné describes for each of the following classes of capabilities.

   a. Verbal information:
   b. Intellectual skill:
   c. Cognitive strategy:
   d. Attitude:
   e. Motor skill:

5. This activity asks you to discuss the learning conditions necessary to reach performance objectives for capabilities from each catagory.

   Step 1: Select one performance objective that you wrote for each capability in Activity 3.

Step 2: For each objective selected in Step 1, describe the external conditions that support its achievement by the typical student.

Be sure to consider the "distinctive" external conditions identified by Gagné for each type of learning outcome. (If one or more "distinctive" conditions is not particularly important in reading this objective, say so.)

Also identify any other conditions that are, for one reason or another, especially important for these particular objectives.

Step 3: Step 2 concerned the "typical" student. Many students, however, are not typical. Describe the various external conditions required by the range of students usually enrolled in the course to reach each objective.

(NOTE: In completing this exercise, you may find it useful to review a lesson plan you use in order to instill each capability and to see which activities during the lesson are intended to assist the student in taking each step.)

Goal 3.3

Content Outline	Activities-Resources

Goal 3.3: Know How to Plan Instruction in Order to Establish the Conditions Necessary for Learning.

A. Course Planning: Multiple Learning Goals and Prerequisite Sequences* (2)

1. Educational programs, courses of instruction, and individual lessons must all be planned and well organized if they are to lead to the educational goals desired.

   Planning and organization do not mean regimentation although it is true that a regimented classroom will probably be planned and organized. The teacher who wants students to learn and discover on their own will also plan and organize instruction, but in a way that facilitates discovery.

2. Planning is particularly important in vocational education where attitudes toward safety and quality, skilled motor performance, and understanding the principles for applying knowledge must be carefully coordinated.

3. Gagné identifies two main aspects of course planning:

   a. identifying multiple learning goals and making provisions for reaching each, and

* Students should complete Classroom Activity 3, which relates to Objectives 3.31 and 3.32. See Part III.

(2) Essentials of Learning for Instruction, Chap. 5, pp. 96-106. See also (1) Instructional Systems Development for Vocational and Technical Training, Chaps. 10, 11. See also (3) Principles of Instructional Design, Chap. 6.

b. identifying prerequisite knowledge or skills and making provisions for gaining these prerequisites before attempting more advanced topics.

4. The term "multiple learning goals" reflects the fact that a teacher usually has more than one objective in mind when he teaches a lesson. (Gagné uses the terms "objective" and "goal" in his discussion. For the balance of this module, "objective" will be used instead of "goal." This term not only emphasizes the primary concern with specific classroom objectives, but is also more compatible with the terminology used in later modules.) The vocational teacher will at the same time wish to influence attitudes, teach facts and principles, and help students gain manipulative skills.
   a. All objectives for a particular lesson must be identified so that adequate supports can be provided for each of them.
   b. Such identification will not only help to avoid over- or under-emphasis on a particular objective but will also help to show the relationship among the objectives. This latter will be useful in helping to determine prerequisite sequences.
5. "Prerequisite sequences" identify the skills or knowledge needed in order to gain new skills or knowledge. Prerequisite sequences, as Gagné

discusses them, are based on capability, not content.

a. This is not to say that capability statements are free of reference to content; they usually are not. Rather, this suggests a method of determining prerequisites that begins by asking, "What capabilities must a person have in order to gain this new capability?" not "What content should a person have covered in the past?"

b. The identification of prerequisites can not only help in the arrangement of topics in a course, but can also have effects at the program or institutional level.*

6. Effect of Multiple Learning Objectives and Prerequisite Sequences on Course Structure in Vocational Education. These two factors can greatly affect the structure of vocational courses. Among other things, they can affect:

a. starting points for the class;

b. topics to be added or deleted;

c. sequencing of topics in a course;

d. time spent on a topic and the emphasis given to it;

e. criteria set for course entry;

f. degree of topic choice that can be left to the student;

g. type of adjustments possible for special groups such as the handicapped, disadvantaged, and minority group members;

h. adjustments to be made in the course when trouble is encountered by students.*

* See Discussion Question H in Part III.

* See Discussion Question I in Part III.

B. The Events in a Lesson (2)

1. Lessons within a course must also be planned. This means that instructional events, which will allow each learning step to be taken, must be included. Gagné suggests the following relationship between "steps" and "instructional events."

Step	Instructional Events
Motivation	Activating motivation; informing learner of objective
Apprehending	Directing attention
Acquisition	Stimulating recall; providing learning guidance
Retention	None
Recall	Enhancing retention
Generalization	Promoting transfer
Performance and Feedback	Eliciting performance; providing feedback

2. A lesson, as defined by Gagné, is a segment of instruction designed to help students reach a "single primary objective." The specific activities undertaken to support each instructional event should be directed toward reaching this objective.
   a. At the same time, adequate support for other learning objectives must be provided.
   b. Special care should be taken to supply the "distinct external conditions" that are necessary for each objective to be reached.*

(2) Essentials of Learning for Instruction, Chap. 5, pp. 206-222. See also (3) Principles of Instructional Design, Chaps. 7, 8. See also (1) Instructional Systems Development for Vocational and Technical Training, Chap. 4.

* See Discussion Question J in Part III.

3. The instructional events for each step are discussed briefly in the following material, with a suggestion as to how each event can be handled in vocational education.
   a. Motivation involves activating motivation and informing the learner of the objective. The vocational teacher often has an advantage over his academic counterpart when it comes to motivation. Presumably, the vocational student is in the class because he wants to learn a trade or occupation, and lab or shop activities can easily be made worthwhile and realistic. Classroom learning can be readily linked to practice in the lab or shop.
   b. Apprehending is characterized by directing attention to the appropriate aspects of the stimuli of the lesson. Vocational educators again have an advantage in that they deal for the most part with concrete objects and specific skills that can be pointed to, manipulated, or demonstrated. On the other hand, important parts of equipment may be hidden from view; skill may be executed so rapidly that the beginner may not be able to comprehend all the specific steps involved; and so on. Vocational educators have developed a variety of teaching aids (such as transparent models of equipment) to overcome many of these problems.
   c. Acquisition has as its goal the proper coding and storage of information. The

two main events of a lesson that Gagné identifies in this phase are stimulating recall and providing learning guidance. On first consideration, the former event may seem out of place; it is not, however. Coding and storage are most effective if new learning is related to relevant prior learning. In this context, "stimulating recall" means assisting students in recalling relevant materials to provide a framework for learning new information. "Providing learning guidance" means planning the lesson so that what students store will help them to achieve the objective toward which they are striving.

The vocational educator must make sure that students associate what they learn with learning in other domains. For example, the student should know how to apply cognitive knowledge and concepts to the skilled performances required by his trade.

d. Retention has no instructional events associated with it. This is because the retention phase is one in which no activities designed to support an objective are carried out. The teacher can, of course, provide reviews and quizzes, suggest new applications, and so on. However, as soon as the teacher does this, retention is over and acquisition reinstated, or a subsequent event is begun.

e. Recall is characterized by enhancing retention. Retention is enhanced by providing the student with repeated opportunities to use a skill in a variety of situations. Vocational education lends itself to this very well as knowledge gained in the classroom can be applied to practical problems in lab or shop. Further, complex motor skills and advanced techniques demand the repeated use of the more elementary skills, thereby providing practice in using these elementary skills.

f. Generalization involves promoting transfer in either the "vertical" or "horizontal" sense as Gagné uses those terms. In the former, old learning is a component of more complex, new learning. In the latter, an old skill is applied to a new problem. Again, vocational education provides a variety of opportunities for transfer. Working from simple to complex skills is a convenient way to promote vertical transfer, and the careful integration of classroom and lab or shop activities allows the use of old learning in new situations.
In cases where performance cannot be practiced at once in a realistic situation because of expense, difficulty of terminal performance, or safety factors (pilot training is a prime example), transfer by simulation or past tasks can be used to allow students to reach the intended objective in reasonable steps.

g. Performance and feedback are the final steps of the lesson. Performance as specified by the objective must be satisfactorily demonstrated. Only by satisfactory performance of the appropriate job skills can a student show that he has reached the objective.

Feedback indicates to the student either that he has reached the objective or that specific improvements are needed to achieve the desired level of performance.

C. Study Activities

1. Two main aspects of course planning are identified by Gagné. Describe each and explain its usefulness in a few lines.

   a. Identification of multiple learning objectives:
   b. Arrangement of sequences of prerequisites:

2. Outline the type of "edit" suggested by Gagné to help in each aspect of course planning.

3. Describe a case (either actual or hypothetical) that illustrates how an edit might affect the topics included in a course, their sequencing, the time devoted to each, and the way in which each is taught.

   Sample: The accurate machining of most objects requires the machinist to be able to make precise measurements using a micrometer. Therefore, the instructor devoted a great deal of time and effort to assuring that students could use several types of micrometers with the degree of accuracy needed in his course.

4. A VECS may be called upon to help a teacher or curriculum designer make adequate provision for reaching performance objectives. An "edit," as suggested by Gagné, would be very useful in this endeavor.

   To make it easy for both a VECS and an instructor to conduct such an edit, construct a suitable form or checklist. The format and details of content are up to you. At the least, the form or checklist should include space for stating:

   a. the objectives;
   b. the type of expected learning outcome(s) for each objective, including any subcategories of your own devising that seem particularly relevant in vocational education;
   c. an indication of what skills and knowledge are assumed at the beginning of the course;
   d. a specification of which skills or knowledge included in the course are themselves prerequisites for later skills and knowledge in the course;

e. the instructional features that are included to support each of the objectives; and

f. the outcome question with specific reference to the particular skill or knowledge involved.

Try to keep the form simple and easy to use. If possible, have two or three vocational instructors try it out and evaluate it as to ease of use and utility in course planning.

5. Review a course outline that you prepared either for a course that you teach or for an activity.

What topics in the course outline provide skills or information necessary for subsequent topics in the course? In later courses? Use the following chart in answering this item.

Topic	Depends on These Earlier Topics	Sets Stage for These Later Topics
Sample: Precision turning of a cylindrical shaft	a. Use of micrometer b. Machine setup and use of tools	a. Turning a tapered shaft and other noncylindrical shapes b. Making bearing for cylindrical shaft

In the table below, list the objectives associated with each topic.

Topic	Objectives for that Topic
Sample: Precision turning of cylindrical shaft	a. Set up job properly. b. Perform job efficiently and safely, accurately assessing efforts and continuing until job is satisfactorily done. c. Properly care for and store tools once job is completed.

a. What is the average number of objectives included in a topic?
b. Does an objective appear in more than one topic? If so, is this acceptable? Explain.
c. Can the objectives readily be written as behavioral objectives? Explain.
d. Would use of the form or checklist you developed for Activity 4 have facilitated the identification of prerequisite sequences and multiple learning objectives in setting up this course? Explain.

6. Write the name(s) of the major instructional event(s) that Gagné identifies as belonging to each learning phase. These instructional events are the events that should take place in a lesson.

Learning Phase

a. Motivation
b. Apprehending
c. Acquisition
d. Retention
e. Recall
f. Generalization
g. Performance
h. Feedback

7. Briefly describe each instructional event and provide an example showing why it is important in vocational education.

Sample: Enhancing retention means providing sufficient practice at frequent intervals to prevent forgetting of important facts or information.

Example: The student should be given sufficient opportunity to use his skills in measuring with the micrometer so that he will not be "rusty" when he assesses the quality of his work in turning the cylindrical shaft.

(NOTE: Keep your answers at the level of generality used in this sample response. You will be asked to show how to plan instruction to provide for each event in conjunction with the next objective.)

8. Consider the topics that you identified in completing Activity 5.

   a. Identify the primary objective for each topic.

   b. Select one topic that has a cognitive skill as its primary objective and a second that has a psychomotor skill as its primary objective. If any of the topics have a primary affective objective, select one of these also. By Gagné's definition, a "lesson" can be constructed so as to lead to each of these primary objectives.

   c. Outline a lesson plan for those topics selected in item b. Use the table on the next page to show how you would support each instructional event.

Primary Objective: _____

_____

Instructional Events	Support for Each Instructional Event
Sample: Activating motivation to turn cylindrical shaft properly.	a. Explain importance of properly turned shafts in a variety of applications. b. Show pictures or actual examples of machine damage due to improperly turned shaft.

(Continue this table on extra sheets of paper as required.)

Goal 3.4

Content Outline	Activities-Resources
Goal 3.4: Know How to Deliver Instruction to Meet Individual Needs.	(2) Essentials of Learning for Instruction, Chaps 6.
A. Overview	
1. Both Gagné (2) and Law (6) are concerned with meeting the needs of individual students. Law concerns himself with the rebuttal of common assumptions underlying group instruction and with providing practical guidelines for meeting the needs of individual students. Gagné is concerned with showing how each instructional event can be realized in a tutorial or self-instructional setting.	(6) "Teaching Strategies for Individual Learning."
a. Both Gagné and Law treat individualization as a practical way of meeting the genuine needs of students with different backgrounds, interests, and capabilities. They do not argue that every student whim must be satisfied, every instructional fad followed, or every gadget bought. Law, in particular, goes out of his way to allay such fears.	
b. The following discussion will be concerned with ways of meeting individual student needs in a practical way.	

B. Assumptions Underlying Group Instruction (6)

1. Law claims that four assumptions underlie group instruction. By "group instruction," Law means instruction in which all members of a class are treated alike, without regard to their differences. In arguing against group instruction, therefore, he is referring to instruction that is insensitive to individual needs, not to instruction in the classroom. The assumptions named by Law are:
   a. Students have common levels of educational skill and background.
   b. Students can learn adequately from a common curriculum.
   c. Group instruction is more economical than individual instruction.
   d. Expensive educational media are necessary to provide individual instruction.*

(6) "Teaching Strategies for Individual Learning."

* See Discussion Question K in Part III.

C. Individualizing Vocational Instruction (6), (2)

1. The problem of individualizing instruction is the problem of providing enough support so that each student can take each of the steps needed to complete the learning act. Sometimes a variety of supports will be required; at other times, students will all be able to take the step using the same supports.
2. The readings for this section of the module complement each other.
   a. Gagné discusses conditions designed to support each learning event in three instructional modes: group instruction,

(6) "Teaching Strategies for Individual Learning."

(2) Essentials of Learning for Instruction, Chap. 6 to p. 138.

tutorial instruction, and individual learning. Law discusses practical guidelines for accomplishing individualization.

b. Notwithstanding the complementary nature of the two readings, confusion might arise from the fact that Gagné's use of the term "group instruction" differs from Law's. Law's use implies an insensitivity to individual differences; Gagné's use implies merely that students will be taught in class-sized groups and that individual needs must be met within that context. Law's examples of individualizing teaching in classroom settings are consistent with Gagné's use of "group instruction." *

3. On page 132 of his text, Gagné provides a table that shows the instructional events and how they are realized in each mode of instruction. Note that the character of the events remains constant even though the support for each event may differ from mode to mode.

   a. There is no reason why the same mode must be used for all instructional events within a given lesson. For example, a teacher may find it necessary to search out appropriate motivation for each student (tutorial mode), then switch to a group mode for several events, and then back to a tutorial mode for promoting transfer. The exact mix chosen will depend on the students, the course, and the facilities.

   b. In selecting the appropriate mix, the guidelines offered by Law can be useful.

* Students should complete Classroom Activity 4.

These guidelines, developed for application in vocational education, are:

(1) Human contact, that is, learning the relevant characteristics of each student;

(2) Student participation in curriculum planning, that is, encouraging student participation within the limits set by program goals;

(3) Teaching activities, that is, adapting the teacher's classroom behavior in accordance with the demands of the individualized environment;

(4) Preliminary assessments, that is, determining each student's capabilities at the start of the class to determine where each student should begin.

(5) Individual planning and contracting, that is, making sure that each student understands what is expected and has a hand in determining these expectations;

(6) Instructional materials, that is, providing a variety of materials adequate to meet various needs;

(7) Supervised study, that is, providing timely help and guidance to individual students or groups of students as they work toward their goals;

(8) Self-correction and final assessment, that is, instructing the student in the importance of evaluating his own work and of meeting standards that he helps to set.*

* See Discussion Question L in Part III.

4. Tutorial and individual instruction are possible in the vocational classroom because of the individual or small-group nature of the work station in the shop or lab and because of the alternate modes of presenting cognitive and motor skills that are usually available.
   a. Tutorial instruction is facilitated by the close student-teacher contact caused by the individual work station. As the instructor moves from student to student, he can use different methods for motivating and aiding each student in learning and in applying that learning to new situations. What works best in helping one student with a difficult problem may be less effective with another. For example, a student having difficulty with a motor skill may benefit most from performing the task while the instructor talks him through it, whereas another student may benefit most from watching while the instructor demonstrates. Thus, by being alert and flexible during individual contact, the instructor can bring the advantages of tutorial instruction to individual students, without a great amount of extra preparation.
   b. Individual learning is also facilitated by the inherently individual character of vocational education. As the student becomes more advanced, he can take increased responsibility for developing projects, searching out new information, applying what he knows to new projects, and

evaluating the quality of his results. At the same time, the teacher can be available to render assistance in planning and executing the project. With this type of learning, the teacher becomes one of many resources that the student may use.*

* See Discussion Question M in Part III.

D. Study Activities

1. List the four assumptions that Law claims underlie group instruction. In a page or two, discuss each assumption, covering the following points:

   a. the extent to which you feel the assumption is held among teachers;
   b. why the assumption is not valid as a general rule;
   c. examples of special cases in which the assumption is valid, if any.

2. Find two or three other assumptions you have detected that underlie group instruction. Describe each in a paragraph or two, covering the points listed above for each assumption.

3. Prepare an outline of a talk that you would give to a group of vocational instructors to explain how Law's guidelines can be used to individualize instruction. In this outline, be sure to:

   a. describe and explain each guideline.
   b. show, by examples, how each guideline can be used. These examples should be taken from actual practice at that school, showing how a teacher is already following a guideline in practice, perhaps without realizing it. These examples should show how individualizing instruction leads to effective learning.

4. Explain why the vocational classroom is a convenient setting in which to encourage increasingly independent learning efforts on the part of the student.

   a. The instructional events discussed by Gagné are listed below. For each, give a specific example to show how it can be realized in a tutorial mode in a vocational classroom without disrupting the class.

Instructional Events

Activating motivation	Enhancing retention
Informing learner of objective	Promoting transfer
Directing attention	Eliciting performance
Stimulating recall	Providing feedback
Guiding learning	

Sample: Promoting Transfer. The instructor would like his students to be able to transfer the skills gained in turning a cylindrical shaft to the machining of noncylindrical shapes. Some students will learn quickly while others will have difficulty in transferring their knowledge and skills. As he moves from work station to work station, the instructor can adjust his hints, suggestions, and reminders in accordance with the ability of students to transfer. He may also assign different jobs to students demonstrating different abilities.

b. Consider a student who wants to move on his own from one of the topics that you listed in Activity 5 for Goal 3.3 to one of the later topics. Show, by example, how the student could use resources available in the lab or shop, library, classroom, or elsewhere to provide his own support for each instructional event.

Sample:

Activating Motivation Since the student wants to move to a new topic, one can assume that he is motivated. He may have come by this motivation by determining that machining a noncylindrical shaft of a certain type would result in a personally useful skill or product or would present an interesting challenge. In order to make such a determination or to become intrigued by such a challenge, the student might have used manuals, displays, or other materials available in the shop or library.

Guided Learning The student determines what steps must be undertaken to complete a project and determines the procedures for setup and machining for each step. In doing this, he seeks out appropriate reference materials and manuals, and consults with the instructor, etc.

Wrapup Activity

NOTE: To meet the basic requirements of this module, select one of the following activities and complete it as directed. If you wish to gain additional credit beyond the basic requirements, you may choose a second activity to complete. Consult with your instructor first if you wish additional credit.

1. Introduction. In this activity, you will be asked to help another person assess the external conditions necessary for reaching instructional objectives. This situation will simulate one in which a VECS helps a person from another vocational field. It will not perfectly match the actual situation, of course, because the person being "helped" will be as sophisticated as the helper; in practice this will less often be true.

   Step 1: Team up with someone in the class whose area of subject-matter expertise is different from your own.

   Step 2: Decide which of you is to be the VECS and which the teacher.

   Step 3: The teacher presents course objectives to the VECS who will then help the teacher plan his course so that students can reach the objectives. A plan will include:

   a. a statement of appropriate performance objectives;
   b. identification of "distinctive (critical) external conditions" needed for reaching each objective;
   c. identification of relationships among objectives that serve to establish prerequisite sequence; and
   d. planning a lesson or two so that appropriate arrangements are made to satisfy each of the distinctive external conditions.

(Notes on completing Step 3:

a. The teacher should pretend that he is being introduced to this method of assessing external conditions for the first time.
b. The teacher and VECS should cooperate with each other. Genuine difficulties brought on by philosophical disagreements or differences in amount of specialized knowledge will no doubt occur; that is fine. What is not fine is attempting to trick or trap the other person.
c. Step 3 can be shortened as convenient. Stating specific performance objectives for every course objective, for example, would probably be excessive.)

Step 4: Reverse roles and repeat Step 3.

Prepare a five-page paper describing the results of your efforts. Devote one section of the paper to your experiences as the VECS and one to your experiences as the teacher. The contents of each section are up to you. Topics you might wish to include are:

VECS Section

a. the extent to which a lack of subject-matter expertise hindered your efforts;
b. the strategy you used in soliciting information from the instructor and how you would change this strategy in the future;
c. the ways in which you felt you helped the instructor in formulating objectives, identifying prerequisites, introducing new techniques, etc.

Instructor Section

a. insights and helpful suggestions that the VECS was able to offer;
b. possibilities for instructional approaches that you previously had not seen;

c. points at which you found the VECS's lack of subject-matter expertise to be a significant obstacle;
d. ways in which playing the teacher might help you improve your performance as a VECS in a similar situation.

2. Many of the study activities for this module asked you to apply the information or techniques discussed in the references to problems or situations in your area of subject-matter expertise. As a VECS, you will work with people from many subject-matter areas. Knowledge of specific applications in other areas will assist you in working with a wide variety of teachers, as well as with others in your class.

This activity asks you to collect the responses given to one or more of the study activities by various members of the class, compile them into a booklet, and summarize key points made in the responses.

Step 1: With your instructor, decide which study activity (activities) you will work on. This may require compromise if others want to work on the same activity.

Step 2: Collect the responses to the activity made by each member of the class.

Step 3: Put the responses into a consistent format.

Step 4: Summarize the key points made in response to the activity. In preparing this summary, you may find it useful to ask yourself the following questions:

a. What similarities were there across fields?
b. Were there striking differences among fields?
c. What techniques or approaches could be easily generalized from field to field? Which could not?

Step 5: Compile the results of the activity for distribution to others in the class.

Part III:

Group and Classroom Activities

PART III
GROUP AND CLASSROOM ACTIVITIES

Classroom Activities

NOTE: The following activities are designed for use in the classroom to stimulate discussion on specific topics covered in this module. The activities are designed to be used following student self-study; however, depending on the background and abilities of students, these activities may not require previous study. All classroom activities are keyed to the content outline to indicate an appropriate point for participation.

1. Pros and Cons of Performance Objectives

   Ask students to list two or three objections to the classroom use of performance objectives and to bring these lists to class. These objections may be their own or ones that others have voiced. The student who has trouble with this may find Kapfer (4) helpful.

   Set up a round-table discussion in which the participants discuss the utility of performance objectives for students in vocational classes, for administrators of area vocational schools, for vocational counselors, and for others in vocational education.

   For purposes of discussion, two or three participants should be generally for behavioral objectives and two or three should be generally against them.

   (The views that participants take should be determined by the advantages and disadvantages that they see in behavioral objectives.

   Among the points that an advocate might make are:
   a. behavioral objectives clarify what is to be learned;
   b. behavioral objectives clearly show the relevance of each learning activity;
   c. behavioral objectives ease the pain of evaluation and feedback by unambiguously stating what is to be required of the student.

Among the points that a detractor might make are:

a. behavioral objectives are apt to be overly specific and to dwell on isolated facts that can be acquired by rote;
b. behavioral objectives trivialize abstract concepts and aesthetic appeal by reducing everything to a mechanical sequence of steps;
c. preparing lengthy lists of objectives is very time consuming and, more often than not, turns into a bureaucrat's dream of endless paper.)

2. Distinctive Learning Conditions in Vocational Education

Exercise 5 for Goal 3.2 asks students to identify distinctive learning conditions for specific performance objectives. The learning conditions identified as distinctive will no doubt vary for objectives representing each class of learning outcome. The conditions identified as crucial should be summarized in class, using a table similar to the one below, and drawn on the blackboard. (This activity can, of course, be shortened by selecting one or two classes of learning outcomes that particularly interest your students.)

Step / Class of Learning Outcome	Motivation	Apprehending	Acquisition	Retention	Recall	Generalization	Performance	Feedback
Verbal Information								
Gagné		X	X		X	X		
Student 1								
Student 2								
Intellectual Skill								
Gagné			X		X	X		
Student 1								
Student 2								
Cognitive Strategy								
Gagné			X					X
Student 1								
Student 2								
Attitude								
Gagné	X						X	X
Student 1								
Student 2								
Motor Skill								
Gagné			X				X	X
Student 1								
Student 2								

For Discussion:

a. Did the steps that require special attention (as identified by students in the class) differ from those identified by Gagné? If so, why?

(Possible answers: students identified more--or fewer--conditions as crucial; particular subject-matter areas place unusual demands--for example, attitude toward quality may involve a great deal of apprehending in that cues to a well-done job differ only subtly from cues for a poorly done job in some fields, but apprehending was not identified as important for attitude by Gagné.)

b. Does vocational education place demands on the learning environment that differ significantly from those placed by education in general?

(Possible answers: yes, because in vocational education there is more frequent interplay between cognitive and motor skills than in most other areas; no, because all fields place the same demands but in different proportions; yes, because the range of student abilities is unusually large--moreover, a wide range of capabilities must be developed and students who are good at cognitive learning may be poor at motor learning and vice versa.)

c. Can individual differences among students make it necessary to provide an unusual amount of support for some of the learning steps? Provide examples.

(Be sure to consider handicapped and disadvantaged students as well as non-special-needs students who naturally have a variety of individual differences among them. The best way to lead the discussion, if students come up dry, is to relate how you dealt with a particularly truculent instructional difficulty presented by a student. For example, a visually impaired student may need special help in the acquisition of the skills needed to properly adjust a joiner in a woodworking shop.)

3. Planning Instruction Based on Course Goals

Wrapup Activity 1 suggests a role-playing situation in which one student, acting as a VECS, helps another student, acting as a teacher, to translate course goals into objectives, to identify necessary external conditions, and to plan instruction to satisfy these external conditions.

a. Allow class time for this role-playing.

b. Discuss difficulties encountered by a VECS as he attempts to help a person in another subject-matter area with course planning.

c. Discuss ways in which the teachers found the assistance of the VECS helpful.

(See Wrapup Activity 1 for more details on setting up this activity. The Wrapup Activity suggests areas in which difficulties might arise and ways in which the VECS might be helpful to the instructor. Encourage your students to identify additional ways in which the VECS could help the instructor and to suggest methods for overcoming any difficulties that arise.)

4. Gathering Information to Individualize Instruction

(NOTE: The purpose of this activity is to give class members practice in preparing instruction for students with a wide variety of backgrounds. It requires them to deal with individual differences.)

Step 1: Each student should be assigned the task of deciding how he would handle his classmates in a course that he teaches. Classes probably represent widely disparate fields of subject-matter competency. Some backgrounds will be very useful; some not. For convenience, assume that all class members are bright, well-motivated, and will do their homework.

Step 2: Each student in the role of instructor should interview three classmates selected at random to determine what academic and motor skills they possess. This may require more than superficial probing to identify similarities (if any) among the skills needed in disparate fields.

Step 3: Having interviewed the students in Step 2, the "teacher" should then meet again with each student in turn to develop a plan of learning activities for that student. The plan may include remedial work, activities that apply already known skills to problems in the new field, alteration of course content to match the needs of the student, and so on. For example, a distributive education student might profit in a course in auto mechanics because part of his job will be to help customers select auto parts, but his exact needs would differ from those of a future mechanic.

Step 4: "Instructors" should prepare a one- or two-page summary of the instructional needs and goals of each student, including the plans developed to reach these goals, and a general discussion of how these disparate goals can be reached in a single classroom.

Step 5: Each "student" should review the paper of the "instructor" with whom he dealt to be sure that the goals and learning activities specified are indeed those which he understood. Any differences of opinion between "student" and "instructor" should then be ironed out by consultation between them.

Activities for Additional Credit

NOTE: These activities are designed for the student who wishes to obtain additional credit beyond the basic requirements of this module. You may choose to write a paper on one of these activities, or discuss the activity with the instructor, or you may select some other method to complete the activity.

1. Learning Objectives and the Roles of a VECS

   (NOTE: This exercise can also be used to stimulate class discussion.)

   Gagné, page 74, discusses the usefulness of learning objectives for the teacher, student, and others in education. Consider the following curriculum management functions that a VECS might perform:

   a. Conduct a needs assessment.
   b. Design and develop a vocational education program.
   c. Select appropriate personnel for a program (for example, teachers, counselors, administrators) and coordinate their efforts.
   d. Select and organize content.
   e. Implement and manage program.
   f. Evaluate materials and programs.

   Select one or two of these roles and, in a four- or five-page paper, discuss the following:

   a. how performance objectives might help the VECS in filling each of these roles;
   b. the level of formality suitable for stating objectives associated with each function.

   In addition, write two objectives that would be useful for the VECS in performing each function. These may be objectives for the VECS or objectives for others, which will help the VECS in his work.

2. Sources of Individual Differences and Individualizing Instruction

Many sources for individual differences exist. A listing of factors underlying differences that are of importance in vocational education has been compiled by Krebs and Krebs (5). These sources are:

Group Sources

a. age
b. cultural background
c. race
d. special needs (e.g., disadvantaged)
e. standard of living

Individual Sources

a. character structure/personality
b. educational level
c. educational background
d. family composition
e. general abilities/basic skills
f. handicaps
g. interests
h. learning styles
i. parental attitudes
j. physical strength and coordination
k. self-concept
l. special talents
m. vocational maturity

Consider these sources of differences relative to the instructional events listed by Gagné. For each event, select the sources of differences that seem most likely to cause student variability and that demand individualization to support that event. Explain each choice in a paragraph or two and provide an example of how the factor has its effect.

For each source of difference-instructional event combination identified, explain in a paragraph or two how Law's guidelines for individualizing instruction could be used to meet the needs of a heterogeneous group of students. If you know of techniques not included in Law's guidelines, feel free to use them in your discussion.

Discussion Questions

A. Exercise 1 asks students to show how the various factors influence program objectives. Students should be asked to share their results at this time.

B. The factors identified by Strong as influencing performance objectives are themselves shaped by various agents within society. Strong's model shows many of these agents. Discuss how each agent has its effect in shaping national priorities, state priorities, manpower needs, institutional goals, and program objectives.

(Many examples are possible. Labor unions can, for example, influence manpower needs by regulating the number of persons admitted to their apprenticeship programs.)

C. How could Strong's model be improved? What conceptual effect has time had on Strong's model? What other influences on these factors should be acknowledged?

(The Strong model could be improved by including "feedback" so that information affecting policy can reflect grass-roots experience.)

D. According to Strong's model, the following exert a direct influence on <u>classroom objectives</u>:

a. program objectives,
b. teachers,
c. students, and
d. parents.

Discuss the role that each of the above should play in determining objectives for a particular class.

(The discussion should consider the following points:

a. overall course goals <u>and</u> specific objectives once these goals are set;
b. whether the influence of each of the above should vary as a function of course content or type of activity in the course;
c. how conflicts between two or more of the above should be resolved.)

E. Ask students for examples that illustrate how objectives serve to do each of the things mentioned in C, "Importance of Objectives."

(Examples should come from vocational education, and should include objectives from both non-classroom and classroom situations. For example, if institutional goals clearly state that minority students are to be trained for admission to occupations from which they were previously excluded, then program objectives can be more readily formulated not only to allow for the special instructional needs of this group, but also to provide extra counseling and community relations efforts to overcome the effects of prejudice.)

F. Activity 3, Goal 3.2 asks students to write performance objectives for each type of capability. At this time, ask students to present their objectives in class and indicate for each if there is a range of "situations" and "actions" that could be considered equally valid indicators of the desired outcome performance.

G. Gagné discusses the degree of formality necessary in communicating objectives.

1. Briefly summarize his position.

   (Different amounts of detail are appropriate in different situations.)

2. Examine the Objectives for this module and for other modules in this series.

   a. Are the objectives too formal? Too informal?

   b. What advantages/disadvantages?

   (In this discussion, students should be sure to consider the fact that these materials were developed for use by a highly diverse group of students and instructors in a wide variety of settings.)

H. What are the implications of an emphasis on capabilities rather than content in the establishment of prerequisites? Why is the former approach more compatible with the use of behavioral objectives or performance-based or criterion-referenced instruction than the latter?

(Implication: Skills possessed, not courses taken, should be assessed; division of topics into course may be altered--devoid examples; skills gained, not grade earned, will be the criterion for assessment of course performance.

Compatibility with Behavioral Objectives: Objectives can be directly translated into capabilities, performance, and criteria; the reverse is also true. Content does not really say if the person has gained competence.)

I. Ask students to provide specific examples of how "multiple learning objectives" and "prerequisite sequences" affect (or could affect) each of the items just mentioned: starting points for the class, topics to be added or deleted, etc.

(A large number of examples can be given. Two brief examples are given below; students should provide more detailed ones for class discussion.

1. Multiple learning objectives affected the degree of topic choice left to the students in an automotive class. The class, an introductory one, was designed to teach the theory of engines, basic skills in maintenance of engines, braking systems and electrical systems, and safe driving. The instructor found that he had to insist that students not spend all their time directly working on cars as many of them would have, left to their own devices.
2. Prerequisite sequences necessitated adjustments in a dental hygienist course when a large number of disadvantaged students enrolled. In this case, the adjustment involved greater individualization because some students lacked basic knowledge necessary for success in the course while others enjoyed this knowledge.)

J. The activities for Goal 3.3 ask students to consider how to support each instructional event. Student responses to these activities should serve as a basis for class discussion. Topics that might be discussed include:

a. techniques used in various vocational fields to support learning;
b. transferability techniques from one vocational field to another;
c. how support for instructional events can be chosen with consideration of objectives other than the primary objective for the lesson.

K. It is likely that the validity of each assumption named by Law will vary as a function of school, course, subject matter areas, and capability to be learned. This shift in validity is something to which the VECS should be sensitive. Therefore, it is important to critically assess each assumption relative to particular situations. Discuss the following issues:

a. What arguments can be presented against each assumption?

(Law identifies several arguments in his article; ask students to supply additional criticisms.)

b. Are there any cases in which one or more of the assumptions might be valid? Explain.

(Yes, there are. For example, a group of skilled journeymen electricians who are to be instructed in the implications of a change in building codes for their work may for all practical purposes be assumed to be able to learn from a common curriculum, and to have common levels of educational skills and background.)

L. Activity 3 for Goal 3.4 asks students to give examples of how Law's guidelines can be used to individualize instruction in their classes. Ask students to present their examples to the class. For discussion:

a. Which guidelines are most easily followed? Which present the greatest difficulty? Do the answers to these questions differ among subject-matter areas?

b. Which methods for implementing the guidelines can be generalized across vocational subject-matter areas? Which are less readily generalized? Why?

(In leading class discussion concerning discussion topics "a" and "b," be sure that the answers presented by persons from different subject matter areas are compared carefully with each other. This is particularly important for the VECS, who will have to work with persons from a wide variety of fields, should appreciate the variety of approaches used throughout vocational education. The VECS should also be alert to differences in effectiveness, acceptability, or practicality of various methods of individualization in different subject-matter areas. These differences and their implications for the VECS should be addressed carefully when discussing "b."

M. Activity 4 for Goal 3.4 asks students to provide examples showing how tutorial instruction and self-instruction can be realized in their classes. Ask students to present their examples in class.

For discussion:

a. In which subject-matter areas, or for which categories of learning outcomes, is it easiest to use tutorial instruction or self-instruction? For which is it hardest? Explain.

b. How can techniques for providing tutorial instruction or self-instruction be generalized from one vocational subject-matter area to another?

(In leading discussion, be careful to relate the examples given to the roles that a VECS might fill in helping to establish tutorial instruction and self-instruction in a classroom or vocational center. Pay particular attention to the usefulness of various techniques in different subject-matter areas as the VECS will have to deal with a wide range of disciplines and should be aware of the techniques that are particularly effective or ineffective in each.)

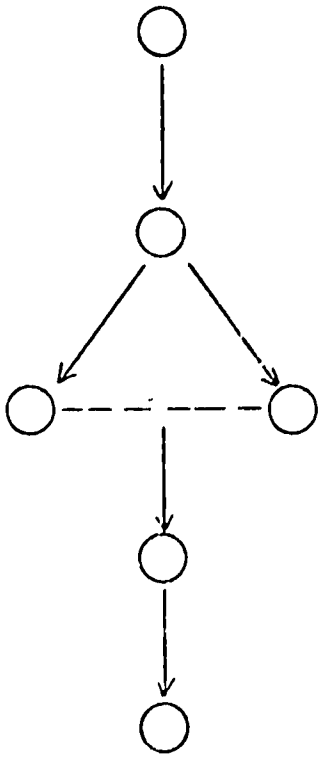
Part IV:

Student Self-Check

PART IV
STUDENT SELF-CHECK

GOAL 3.1

1. The diagram below is a skeleton of a model developed by M. E. Strong to show how educational goals and objectives are affected by many factors in society. Place the appropriate letter from the right-hand column into each circle in the diagram on the left. (3.11)



a. Manpower needs

b. State priorities

c. Program objectives

d. Institutional goals

e. Classroom objectives

f. National priorities

2. Give an example showing the effect of each factor you identified in Question 1 that influences program objectives. (3.11)

3. List two ways in which each of the following factors can influence classroom objectives. (3.12)
   a. Program objectives
   b. Students
   c. Teachers
   d. Parents
   e. Advisory committee

4. For each factor in Question 3, pick one of the two items you listed and provide a brief example to illustrate it. (3.13)

GOAL 3.2

5. Gagné identifies three key aspects of a performance objective. List them. Which of these is the "core" of the statement of an objective? Why? (3.21)

6. Rewrite each of the following statements as a performance objective. Indicate which part of each objective specifies each of the three key aspects of the objective. (3.22)
   a. Bake a cake.
   b. Proofread printed copy.
   c. Fix a flat tire on a bicycle.

7. Gagné lists several external conditions that are particularly critical for the various classes of learning objective. Match each group of critical learning conditions on the right with the correct class of learning objective on the left by placing the appropriate letter in the space provided. (3.23)

Class of Learning Objective	Critical Learning Conditions
Verbal information	Stimulating the retrieval of previously learned component skills
	Presenting verbal cues to the ordering of the combination of component skills

	Scheduling occasions for spaced reviews
	Using a variety of contexts to promote transfer
_____Intellectual skill	b. Reminding learner of success experiences following choice of particular action; alternatively, ensuring identification with an admired model such as a respected peer, instructor or member of the community.
	Performing the chosen action; or observing its performance by the human model
	Giving feedback for successful performance; or observing feedback in the human model
_____Cognitive strategy	c. Verbally describing strategy
	Providing frequent occasions for the exercise of strategies, by posing novel problems to be solved
_____Attitude	d. Presenting verbal or other guidance to cue learning of the executive subroutine
	Arranging repeated practice
	Furnishing feedback with immediacy and accuracy
_____Motor skill	e. Activating attention by variations in print or speech
	Presenting a meaningful context for effective coding

8. Write a performance objective from your field of subject-matter expertise. (3.23)

   a. Identify the class of learning objective to which this objective belongs.

   b. What learning conditions are critical for this particular objective? Explain by showing that special attention must be given to the learning step associated with that condition.

   c. Are the critical learning conditions for this objective the same as those that Gagné identified as being critical for objectives of this particular category?

GOAL 3.3

9. Two main aspects of course planning are identified by Gagné. Describe each and explain its usefulness in a few lines. (3.31)

10. Explain how each aspect of course planning can affect the content included in a course, the time devoted to each item or topic, the order in which topics are presented, and the method by which a topic is taught. (3.32)

11. Give one example from a vocational course that shows how multiple learning goals can affect course planning. (3.32)

12. Give one example from a vocational course that shows how the identification of prerequisite sequences can affect course planning. (3.32)

13. Match the instructional events on the right to the learning steps on the left by placing the letter(s) of the appropriate instructional event(s) in the spaces provided . (3.33)

Learning Step	Instructional Event
____ Motivation	a. directing attention
____ Apprehending	b. providing learning guidance
____ Acquisition	c. activating motivation
____ Rentention	d. enhancing retention
____ Recall	e. eliciting performance; providing feedback
____ Generalization	f. informing learner of objective
____ Performance	g. stimulating recall
____ Feedback	h. promoting transfer of learning

14. Explain briefly how each instructional event furthers the successful completion of the step with which it is associated. (3.33)

15. Consider the performance objective that you wrote in answer to Question 8. In the table below, indicate the environmental arrangements you make to support the instructional events associated with each step. (3.34)

Step	Environmental Arrangements
Motivation	
Apprehending	
Acquisition	
Retention	
Recall	
Generalization	
Performance	
Feedback	

GOAL 3.4

16. List the assumptions that Law says are associated with group instruction. Give two arguments contradicting each assumption. Are there any cases in which each assumption is true? Describe. (3.41)

17. Law provides guidelines in the following areas: human contact; student participation in curriculum planning; teaching activities; preliminary assessments; individual planning and contracting; instructional materials; supervised study; self-correction and final assessment. In three or four paragraphs give an example showing how four of these guidelines can be used to individualize vocational instruction. The example should be set in an actual vocational classroom. (3.42)

18. The instructional events discussed by Gagné are listed below. In a sentence or two, describe a project that a student might undertake in one of your courses. Describe, in terms of the project, how you could support each event, as a tutor would, during a regular vocational class. (3.43)

Instructional Events

Activating motivation	Enhancing retention
Informing learner of objective	Promoting transfer
Directing attention	Eliciting performance
Stimulating recall	Providing feedback
Guiding learning	

19. Consider that the project discussed in item 18 is undertaken as an independent study (individual learning) project. List one or two aids that would be readily available to the student for use in supporting each step and briefly explain why each is useful. (3.43)

Part V:

Appendices

PART V

APPENDICES

Appendix A:

Possible Study Activity Responses

GOAL 3.1

1. (NOTE: The answers given below are sample answers, and only that. Many good answers are possible.)

   a. National priorities, by establishing the criteria for granting federal funds, help determine the state and local organization of vocational education, the manpower needs to be given top priority, and the target groups for services, among other things. Each priority is likely to have an effect on the nature and content of programs. In addition, federal monies are sometimes earmarked for experimental programs that use particular educational approaches in new content areas. In such cases, the influence is very direct.

   b. State priorities have their effect in much the same way as do national priorities. In addition, many states take a very direct role in determining program objectives and, in some cases, even in specifying course goals and teaching materials.

   c. Manpower needs help determine not only the content areas that should be taught to meet local and national labor needs, but also the emphasis to be placed on a content area. The demand for students prepared in a specific subject matter affects the number of teachers and capital investments that are justified; the level and depth of treatment and variety of approach are also affected. Further, within any given subject matter, the exact content and skills that should be learned vary from community to community; this affects the emphasis given to each topic in a program.

   d. Institutional goals, in accord with manpower needs and state priorities, establish official policy for the area vocational school, the high school, or other institution. This helps set general objectives for each program, admissions criteria for students, length of class periods, priorities for acquiring facilities, and so on. Some institutions may even set limits on the techniques that can be used for instruction.

2. (The specific response to this activity depends on the particular program you selected. Many answers are possible; a sample answer was included with the exercise. Be prepared to discuss your responses in class or with your instructor.)

3. (Many answers are possible; a sample answer was included with the activity. Be prepared to discuss your responses in class or with your instructor.)

4. (The responses given below are sample answers only. Many good answers are possible.)

   a. Program objectives: Certain demands are made by the program. Some of these are very direct: a previous course will have taught certain competencies and a subsequent course will require certain others. Thus, objectives should be written to take account of what the student can do at the beginning of the course and what he should be able to do at the end of it. Other program demands are less direct: for example, if the program is designed to provide highly qualified people for specific jobs, in-depth objectives within a narrow range are desirable; if the program is to provide broad entry-level competencies, in-depth objectives must be eliminated in favor of objectives from a greater variety of areas.

   b. Teachers: The teacher will use his expert judgment to decide the instructional form, content, depth of treatment, and so on within the constraints imposed by program objectives, student needs, and parents.

   c. Students: Students can determine objectives if the teacher allows them to choose specific objectives consistent with overall course goals. Also, the talents, background, and special needs of the particular group of students in the class help determine appropriate objectives.

   d. Parents: Parents have certain goals for their children and expectations of the results of learning. They may put pressure on the school or teacher to ensure that their expectations are realized. Their influence is, perhaps, most likely to be felt on program objectives via their impact on institutional goals.

   e. Advisory committee: Advisory committees help determine the specific competencies that must be acquired to secure employment in the local job market. Classroom objectives should be chosen to assure that these particular competencies are included even if they might be omitted in a "typical" program.

5. (The specific response to this activity depends on the particular examples you selected. Many answers are possible; a sample answer was included with the activity. Be prepared to discuss your responses in class or with your instructor.)

GOAL 3.2

1. a. a clear statement of the <u>situation</u> that the student will confront;
   b. a verb indicating the class of capability to be learned (i.e., the <u>outcome performance</u>);
   c. a specification of the <u>action</u> to be taken to demonstrate that capability.

2. a. This objective fails to specify the <u>situation</u> in which the task is to be performed. A satisfactory version would be:

> "Using the tools and equipment available in the shop, the student will distinguish engines that are tuned in accordance with manufacturers specifications from those that are not and make the appropriate indication on a tag attached to each engine."

   b. This objective fails to say what <u>action</u> the student is to perform. Is he to make several estimates from circuit diagrams? Is he to write down a procedure, together with a proof of its validity? What exactly is he supposed to do? A satisfactory version would be:

> "Faced with the problem of doing so in an electronics class, the student will show that he has devised a method for estimating the impedence of any given ac circuit by writing down the method together with a valid mathematical proof that the procedure will accurately give the impedence."

   c. This objective is a bit tricky. The key shortcoming is that the <u>outcome performance</u> is not specified because the capability is not specified. This task may be simple recall of information for the student who has been taught about tooth decay and sugar, or it may be a very sophisticated problem-solving task in which the student must develop an explanation based on knowledge of the formation of dental plaque, the growth of bacteria, the role of sugar in these processes, and the role of bacteria in tooth decay. A satisfactory version would be:

> "A student who has learned basic information about the chemical properties of sugar and the nature of dental plaque and its role in harboring bacteria, will <u>develop an explanation</u> of why sugar leads to tooth decay and write a paper clearly presenting this explanation."

3. (The specific response to this activity depends on the particular capabilities you listed for Module 2. Therefore, answers to this activity will vary. Be sure that you have included all characteristics of a good performance objective. Be prepared to discuss your answers in class or with the instructor.)

4. Verbal information:

   a. activating attention by variations in print or speech;
   b. presenting a meaningful context (including imagery) for effective coding.

   Intellectual skill:

   a. stimulating the retrieval of previously learned component skills;
   b. presenting verbal cues to the ordering of the combination of component skills;
   c. scheduling occasions for spaced reviews;
   d. using a variety of contexts to promote transfer.

   Cognitive strategy:

   a. verbally describing strategy;
   b. providing frequent occasions for the exercise of strategies by posing novel problems to be solved.

   Attitude:

   a. reminding learner of success experiences following choice of particular action; alternatively, ensuring identification with an admired human model;
   b. performing the chosen action or observing its performance by the human mode;
   c. giving feedback for successful performance or observing feedback in the human model.

   Motor skill:

   a. presenting verbal or other guidance to cue the learning of the executive subroutine;
   b. arranging repeated practice;
   c. furnishing feedback with immediacy and accuracy.

   (See text for further discussion.)

5. (Answers to this activity will vary from person to person. Be prepared to discuss your response in class.)

GOAL 3.3

1. a. Identification of multiple learning objectives: The planner identifies all the objectives to be achieved in the course and uses this information to assure that appropriate support is provided for each. This helps avoid a situation in which one or more objectives are overemphasized at the expense of other, equally important objectives.

   b. Arrangement of sequences of prerequisites: The capabilities prerequisite to gaining a new capability are identified. The emphasis is on capabilities, not content, although some capabilities will, indeed, demand content. This helps the teacher to order the course so that those objectives that prepare students for other more complex or advanced objectives are achieved first in the course.

2. Identification of Multiple Learning Objectives

   Editing: For each objective: (1) identify the type of learning outcome; (2) make sure that the important instructional features for that class of outcome are included in the plan; and (3) ask whether the outcome question, i.e., what the student will be asked to do, is adequate evidence of learning for the type of outcome desired.

   Arrangement of Sequences of Prerequisites

   Editing: The course planner determines (mostly through his own expertise) what cognitive or motor skills and attitudinal characteristics the student must possess to achieve the learning outcome for each objective. The types of prerequisites will vary by type of outcome as discussed by Gagné.

3. (The example you provide should clearly show how an edit for multiple learning outcomes might affect topics included by showing that excessive attention is being paid to one area to the detriment of another, thus some topics may be dropped in the former area and topics added in the second. Similarly, time commitment may be found to be excessive in some areas and deficient in others when all expected outcomes are considered. Also, the way in which each topic is taught can be affected by the type of expected outcome. For example, a rule describing how much change to allow for in an expansion joint may be simply given to the student if the outcome is verbal information, whereas he may be provided with background information and asked to develop the rule himself if the expected outcome is a higher-order rule.

An edit of prerequisites can help to determine sequencing by showing that some capabilities must be gained if others are to be acquired. Thus, the prerequisite topics should come first. Similarly, time allotted to capabilities that serve as prerequisites for many later topics may be given a larger portion of time than that topic in and of itself might justify. Finally, if the instructor suspects that a valuable prerequisite he assumed was provided in an earlier course was not in fact provided, he may add it to this course.)

4. (As you prepare the form, be particularly alert to ways in which it might be made easier to use.)

Be prepared to discuss your efforts in class. In this discussion, be sure to:

a. remain open to constructive criticism of the form you develop;
b. understand what others are trying to do before criticizing their efforts; and
c. stay alert to those items that persons with subject-matter specialities other than your own feel are especially important.

5. (The specific response to this activity depends on the particular course outline you selected. Be prepared to discuss the results of your efforts with others in the class.)

6.

Learning Phase	Instructional Event(s)
a. Motivation	activating motivation; informing learner of the objectives
b. Apprehending	directing attention
c. Acquisition	stimulating recall; providing learning guidance
d. Retention	(no associated instructional event)
e. Recall	enhancing retention
f. Generalization	promoting transfer of learning
g. Performance	eliciting performance; providing feedback
h. Feedback	eliciting performance; providing feedback

7. (Descriptions of the instructional events are given by Gagné, pp. 107-119; check your descriptions against his. Also, a sample response is given in the activity. The sample is written at the level of generality desired for this activity.)

8. (The specific response to this activity depends on the particular work you completed for Activity 5. Be prepared to discuss your responses with your instructor or with others in the class. A sample response for one instructional event is given in the activity.)

GOAL 3.4

1. Assumptions:

   a. Students have common levels of educational skill and background.
   b. Students can learn adequately from a common curriculum.
   c. Group instruction is more economical than individual instruction.
   d. Expensive education media are necessary to provide individual instruction.

   Discussions: (Your brief discussions should clearly show that each assumption is erroneous as a general rule, while providing examples of special cases in which it may be valid. The following comments pertain to the points asked about in the statement of the exercise:

   a. This will vary from class member to class member. Be prepared to discuss and defend your views in class.

   b. Law gives adequate rebuttal; however, it would be more profitable to add a rebuttal or two of your own.

   c. The examples can be various. One class of example in which the first three assumptions are invalid occurs when the students have sufficient background to "overpower" the information presented. For example, in teaching mechanics about the location of the hood release on a new model, the instructor can safely assume the first three assumptions to be true.

      The third and fourth assumptions provide traps. You should show how individualized instruction is more expensive than group instruction. A simple demonstration that individualized instruction is expensive is insufficient unless effective group instruction can be shown to be cheaper.

      Discuss your examples with the instructor or with others in the class.)

2. Many assumptions are possible. Among these assumptions are:

   a. Individual programs take an unreasonable amount of teacher time to prepare.
   b. It is much more difficult to adequately monitor student progress when students are working on a variety of different tasks.

   (Be prepared to discuss your response with your instructor or with others in your class.)

3. (Be prepared to discuss your examples with others in the class. Remember that these examples are to be used in a talk to teachers. Therefore, the examples should be simple, capable of brief statement, and clearly pertinent to the guideline under consideration. Test your examples with friends, your spouse, colleagues, etc.; if one of them does not make the point particularly well, find another.)

4. This is a problem with many valid responses. Important points to consider are:

   - The close contact between student and teacher allows the teacher to suggest additional techniques and readings that are most apt to stir the student's interest.

   - In most vocational areas more sophisticated techniques and their usefulness to the student are easily pointed out. A technique of particular interest to the student will help him formulate his goals.

   - As much independent work is done in the lab or shop the student has resources readily available to overcome many difficulties as they arise.

   a. (The examples should show how the teacher can support each instructional event without disrupting the learning process for those not directly involved in the tutorial services at any given moment. A sample response is included with the activity. Be prepared to discuss your responses with others in the class or with your instructor.)

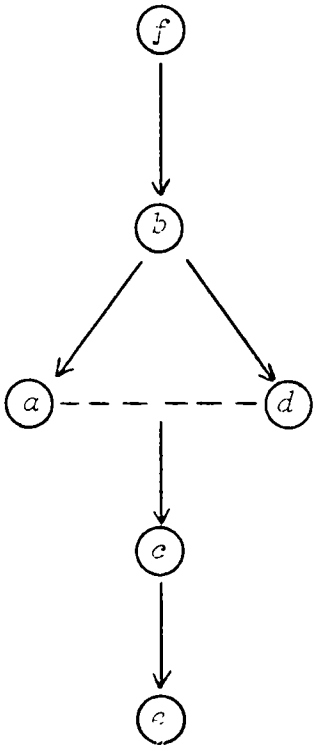
   b. (A sample response is given with the activity. Do not forget to include the instructor as a resource; seeking timely advice from others is a valuable technique in individual learning.)

Appendix B:
Possible Self-Check Responses

(NOTE: Possible answers are given below for the items in the student self-check. Student answers to most questions need not conform exactly to the suggested ones; alternate but equally acceptable answers may be given. Some of the items call for examples; in these cases, the characteristics of an acceptable example are briefly described.)

GOAL 3.1

1. The diagram below is a skeleton of a model developed by M. E. Strong to show how educational goals and objectives are affected by many factors in society. Place the appropriate letter from the right-hand column into each circle in the diagram on the left. (3.11)



a. Manpower needs

b. State priorities

c. Program objectives

d. Institutional goals

e. Classroom objectives

f. National priorities

2. Give an example showing the effect of each factor you identified in Question 1 that influences program objectives. (3.11)

Examples need not be elaborate but should clearly show how program objectives are influenced. For example, the introduction of new building materials and methods may increase the demand for some building trades while making skills in another building trade obsolete by requiring skills not previously taught. The program objectives should be sensitive to these changes.

3. List two ways in which each of the following factors can influence classroom objectives. (3.12)

a. Program objectives

Consider the student answer correct if it includes any two of the following:

(1) by setting goals for the course in accord with program objectives

(2) by helping to determine the type of student admitted

(3) by setting standards for what students should have learned in earlier courses

(4) by allocating funds for purchase of equipment or supplies

b. Students

Consider the student answer correct if it includes any two of the following:

(1) by setting program goals

(2) by choosing objectives

(3) by student characteristics helping to determine what goals the teacher uses

c. Teachers

Consider the student answer correct if it includes any two of the following:

(1) by selecting the content of objectives

(2) by influencing student choice

(3) by helping to set program objectives

d. Parents

Consider the student answer correct if it includes any two of the following:

(1) by influencing school board or institution

(2) by contacts with instructor

(3) by encouraging students in a given direction

e. Advisory committee

Consider the student answer correct if it includes any two of the following:

(1) by indicating the skills most needed in local industry at the present time

(2) by forecasting skills that will become more or less necessary in the future

(3) by identifying union entry requirements and other such factors in the local labor market

(4) by identifying areas in which past graduates of a program have been very well or very poorly prepared

4. For each factor in Question 3, pick one of the two items you listed and provide a brief example to illustrate it. (3.12)

   a. Program objectives

   b. Students

   c. Teachers

   d. Parents

   e. Advisory committee

   The examples chosen should clearly show how each factor influences classroom objectives. The sureness with which the influence is demonstrated should be the key factor, not the level of sophistication in providing detailed embellishments.

GOAL 3.2

5. Gagné identifies three key aspects of a performance objective. List them. Which of these is the "core" of the statement of an objective? Why? (3.21)

   situation, verb indicating outcome performance, action

   The verb indicating outcome performance is the core because it specifies the capability that has to be learned in order to display the intended performance.

6. Rewrite each of the following statements as a performance objective. Indicate which part of each objective specifies each of the three key aspects of the objective. (3.22)

   a. Bake a cake.

   b. Proofread printed copy.

   c. Fix a flat tire on a bicycle.

   The objectives written by the student should clearly show the situation, the outcome performance, and the action. It is possible that different outcome performances can be ascribed to each of the above, depending on the situation.

For example, "Fix a flat tire" may or may not involve problem solving (cognitive strategy), depending on the tools and materials available (i.e., on the situation).

7. Gagné lists several external conditions that are particularly critical for the various classes of learning objective. Match each group of critical learning conditions on the right with the correct class of learning objective on the left by placing the appropriate letter in the space provided. (3.23)

Class of Learning Objective	Critical Learning Conditions
e Verbal information	a. Stimulating the retrieval of previously learned component skills
	Presenting verbal cues to the ordering of the combination of component skills
	Scheduling occasions for spaced reviews
	Using a variety of contexts to promote transfer
a Intellectual skill	b. Reminding learner of success experiences following choice of particular action; alternatively, ensuring identification with an admired model such as a respected peer, instructor or member of the community.
	Performing the chosen action; or observing its performance by the human model
	Giving feedback for successful performance; or observing feedback in the human model
c Cognitive strategy	c. Verbally describing strategy
	Providing frequent occasions for the exercise of strategies, by posing novel problems to be solved

b Attitude

d Motor skill

d. Presenting verbal or other guidance to cue learning of the executive subroutine

Arranging repeated practice

Furnishing feedback with immediacy and accuracy

e. Activating attention by variations in print or speech

Presenting a meaningful context for effective coding

8. Write a performance objective from your field of subject-matter expertise. (3.23)

   a. Identify the class of learning objective to which this objective belongs.

   b. What learning conditions are critical for this particular objective? Explain by showing that special attention must be given to the learning step associated with that condition.

      (The responses need not conform to Gagné; the condition may be critical for a learning objective he has not identified as being generally critical for objectives of that class. The quality of the explanation is what counts.)

   c. Are the critical learning conditions for this objective the same as those that Gagné identified as being critical for objectives of this particular category?

GOAL 3.3

9. Two main aspects of course planning are identified by Gagné. Describe each and explain its usefulness in a few lines. (3.31)

   a. Identification of multiple learning objectives involves the planner identifying all the objectives to be achieved in the course and using this information to assure that appropriate support is provided for each. This helps to avoid a situation in which one or more objectives are overemphasized at the expense of other equally important objectives.

b. Arrangement of sequences of prerequisites involves identifying capabilities prerequisite to gaining a new capability. The emphasis is on capabilities, not content, although some capabilities will, indeed, demand content. This helps the teacher to order the course so that those objectives that prepare students for other, more complex or advanced objectives are achieved first in the course.

10. Explain how each aspect of course planning can affect the content included in a course, the time devoted to each item or topic, the order in which topics are presented, and the method by which a topic is taught. (3.32)

Gagné discusses these matters in some detail (pp. 100-106). In general, the time devoted to a topic, or whether it is included at all, will depend on its value as a prerequisite for later topics and on the time demands imposed by other topics. Order of topics will be determined by prerequisite relationships among topics, and the teaching method will depend on the type of outcome expected. Each of these course characteristics will of course also be influenced by other factors, such as student characteristics, program and institutional goals, and so on.

11. Give one example from a vocational course that shows how multiple learning goals can affect course planning. (3.32)

The example should show the effect clearly. For example, a machine shop instructor may want to teach certain mathematical principles in addition to manipulative skills since each will be needed to adequately set up and execute a job. Since there is, no doubt, both enough math to take up an entire course and enough material on setup and operation to do the same, the instructor must strike a balance so that goals in each area are met.

12. Give one example from a vocational course that shows how the identification of prerequisite sequences can affect course planning. (3.32)

The example should show the effects clearly. For example, the machine shop instructor will sequence his instruction so that the mathematics needed to determine proper setup for a particular job is taught before the student is actually required to do his own setup for that job.

13. Match the instructional events on the right to the learning steps on the left by placing the letter(s) of the appropriate instructional event(s) in the spaces provided. (3.33)

Learning Step		Instructional Event
e	Motivation	a. directing attention
a	Apprehending	b. providing learning guidance
b g	Acquisition	c. activating motivation
	Retention	d. enhancing retention
d	Recall	e. eliciting performance; providing feedback
h	Generalization	f. informing learner of objective
e	Performance	g. stimulating recall
e	Feedback	h. promoting transfer of learning

14. Explain briefly how each instructional event furthers the successful completion of the step with which it is associated. (3.33)

Gagné discusses the instructional events in detail on pages 107-118 and shows their relation to the learning steps on page 119. Student answers should clearly explain how each event furthers completion of that step, not merely explain what the event has to do with that step.

15. Consider the performance objective that you wrote in answer to Question 8. In the table below, indicate the environmental arrangements you make to support the instructional events associated with each step. (3.34)

Step	Environmental Arrangements
Motivation	
Apprehending	The answers given should clearly show support for the steps in question. It is perfectly all right for a single activity to help with more than one step. For example, the demonstration or exploration used to arouse motivation may also help direct attention to key aspects of a task, thereby helping students with the apprehension step.
Acquisition	
Retention	
Recall	
Generalization	
Performance	
Feedback	

GOAL 3.4

16. List the assumptions that Law says are associated with group instruction. Give two arguments contradicting each assumption. Are there any cases in which each assumption is true? Describe. (3.41)

Assumptions:

1. Students have common levels of educational skill and background.
2. Students can learn adequately from a common curriculum.
3. Group instruction is more economical than individual instruction.
4. Expensive educational media are necessary to provide individual instruction.

Rebuttals, either those given by Law or equally valid ones originated by the students, may be accepted. They should clearly rebut the assumption to which they are directed.

The first three assumptions can usually be considered true when a select or highly sophisticated group of students is asked to learn something that is relatively easy. The fourth is often true in vocational instruction where expensive equipment is needed as a normal part of instruction. However, if all instruction is expensive, then the fact that individual instruction is expensive is trivial. This assumption must be supported by an example showing that individual instruction requires more expensive media than group instruction.

17. Law provides guidelines in the following areas: human contact; student participation in curriculum planning; teaching activities; preliminary assessments: individual planning and contracting; instructional materials; supervised study; self-correction and final assessments. In three or four paragraphs give an example showing how four of these guidelines can be used to individualize vocational instruction. The example should be set in an actual vocational classroom. (3.42)

Many answers can be given. A sample acceptable answer is:

A woodworking instructor wishes to have each student in his advanced class build a coffee table of adequate quality to be used in a well-furnished home. Not surprisingly, the students in the class vary in their cabinet-making ability.

(Shows that the instructor made some sort of preliminary assessment.)

The instructor considers having all members of the class build identical tables. However, he rejects this idea because, if elementary techniques are used, the better students would become bored and probably not learn anything new. On the other hand, if more advanced techniques are used, the poorer students would probably not be competent enough and would produce an unattractive product.

The instructor's solution is to work with each student individually to develop a plan using construction techniques appropriate to the level of sophistication of the student. The instructor and the student both agree to the plan before it goes into effect.

(Individual planning and contracting, student participation in curriculum planning, human contact.)

The plan includes standards by which the student can judge his own work and suggests resources for the student to use in his efforts.

(Instructional materials, self-correction.)

At the end of the course almost every student produces an attractive piece of furniture. Furthermore, each student has been able to practice a technique which was initially new to him.

(Final assessment.)

18. The instructional events discussed by Gagné are listed below. In a sentence or two, describe a project that a student might undertake in one of your courses. Describe, in terms of the project, how you could support each event, as a tutor would, during a regular vocational class. (3.43)

Instructional Events

Activating motivation	Enhancing retention
Informing learner of objective	Promoting transfer
Directing attention	Eliciting performance
Stimulating recall	Providing feedback
Guiding learning	

Many acceptable answers can be given. Gagné's Table 6.1 on page 132 of Essentials of Learning for Instruction, shows what a tutor would do in support of each event. Use Table 6.1 to help you assess student responses.

19. Consider that the project discussed in item 18 is undertaken as an independent study (individual learning) project. List one or two aids that would be readily available to the student for use in supporting each step and briefly explain why each is useful. (3.43)

Answers will vary. Institutional manuals, books, cutaways, the instructor, and experts in the community are all possible aids. The brief explanations should clearly show how each supports the step.