

Creating Instructional Materials

Third Edition

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The third edition of *Creating Instructional Materials* has been updated to reflect developments and trends that have evolved since the second edition was published. In the intervening years, a significant trend toward the instructional design (ID) approach has become apparent. Video has all but replaced motion pictures as a production medium in the schools, and the microcomputer has become one of the more exciting and promising instructional innovations. These and other changes are addressed in this edition.

Research indicates that media, when properly selected and utilized, are effective in helping students realize a wide range of learning outcomes. Decisions about the specific kind of medium to use should be based upon the specific learning outcomes that are desired. For example, if the student is to learn a concrete concept, then materials showing the critical properties of the concept are needed. In this case, still pictures might be the best choice. When motor skills are being taught, on the other hand, a motion medium such as television is appropriate.

Preface

Also important, whenever selection is involved, are the design and content of the medium. Simple, inexpensive materials that are well-designed are often better choices than more elaborate materials lacking sound construction.

In addition to these concerns, the educator also must know something about instructional design to make the best decisions as to which media to use. Decisions relating to the selection and production of materials should be made with the broad view of the total instructional sequence in mind. By considering the needs of the students and how they should be able to perform as a result of the instruction, the educator can select and produce the most effective kinds of media. In Chapter 1, this broad view of instruction is outlined. An instructional design model is developed, and materials production and selection are considered within this framework.

The emphasis in Chapter 2, Visual Design, is on the composition of instructional materials. Also included is a discussion on research findings that have implications for the visual designer. Chapter 3 describes the basic production skills of illustration, lettering, and mounting, while Chapter 4 covers photographic skills.

From Chapter 5 on, each chapter is devoted to a distinct kind of instructional medium. The skills and knowledge developed in the preceding four chapters are now applied in the creation of these special materials. Chapter 5 describes ways to design and produce various kinds of print materials. Chapter 6 provides information on the commonly used large format media of posters, charts, graphs, and display boards.

Chapter 7 provides suggestions on how to utilize sound and includes methods for producing tapes for use alone or in conjunction with other media. Projected media, including overhead transparencies, slides, and multi-image presentations, are described in Chapter 8. Suggestions for planning the presentations and creating the materials are also included.

In Chapter 9 the various kinds of motion media (films and video) are discussed. The emphasis is on video use and production since this medium is rapidly replacing film as the dominant choice in the schools. Finally, Chapter 10 provides coverage of computer-generated instructional materials of various kinds. An introduction to the microcomputer and its input and output devices is given. Methods, such as authoring languages, that provide the means for constructing a lesson are then discussed. Other kinds of programs follow, including word processors and graphics programs. An approach to creating graphics with a programming language (BASIC) is also included.

A list of manufacturers and distributors of materials and equipment is provided at the back of the book. This will be useful for those who need to purchase materials not available from local vendors or who wish to acquire equipment of one kind or another.

The general design of the chapters is as follows: a list of performance objectives is provided at the opening of the chapter. This is followed by an introduction and then a discussion of how the medium covered in the chapter relates to specific learning outcomes as described in Chapter 1. Next, the medium is covered in detail with suggestions for selection and production being the primary focus. A summary and references complete each chapter.

Many individuals have assisted with this text, including students in the graphics courses at the University of Utah. Dolores Bullough was tireless in her reading of the various versions of the manuscript. L.F. Beatty and Tom Callister offered useful comments on microcomputer applications. Steve Hess, busy as he was, took the time to thoroughly read and critique the sections on instructional design. And the reviewers, listed below, were conscientious and helpful throughout this project:

Dr. Wenda Clement, Marion College Library
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Creating Instructional Materials

PERFORMANCE OBJECTIVES

Discuss the stages of instructional design

List the domains of learning outcomes

Identify each of the five components in a performance objective

Originate a performance objective in each of several domains

List the factors involved in media selection

Summarize the characteristics of various instructional materials

Originate a lesson and select appropriate materials

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1

A Systematic Approach to the Design of Instruction

The activities of selecting and creating instructional materials and delivery systems are but one part of the more extensive process of designing a total program of instruction. While many teachers produce materials more or less intuitively, or use whatever media are at hand, a better plan is to determine the needs of the students and the desired learning outcomes before materials are selected or designed. This approach assures that the materials will be appropriate to the task at hand, and that the effort and expense involved will not be wasted. The process of systematically developing an instructional program is called *instructional design*; the model used in this approach is termed an *instructional system*. In this chapter, one version of an instructional system is outlined. Rather than trying to make instructional development experts of those who use this text, the intent is to give them an introduction to a process that will enable them to design instruction more effectively and, in particular, to produce or select instructional materials in a more scientific and systematic fashion.

Many approaches to systematic instructional development are to be found. The industrial influence is reflected in the preproduction, production, postproduction model used by some designers. Another model is that described by Reigeluth, et al. (1978). Here, the phases of design, production, and evaluation are stressed. Briggs and Wager (1981) describe an elaborate and very complete model that is favored by some.

Despite the large numbers of different approaches, all of the models tend to share a basic core of common elements. For example, determining the needs of the students is an essential early step in the process. Defining performance objectives is another of the essentials. Designing and producing the instructional materials (the subject of this book) is obviously an important step. Evaluation of the student and the instruction must also be a part of any instructional system.

We will examine in greater detail certain of the stages in a generic instructional system. This approach should help to place the design of materials in its proper perspective, and should furnish a rationale for the selection and production of specific kinds of materials.

AN INSTRUCTIONAL DESIGN MODEL

The design of instructional sequences should begin with a determination of what it is the students should be able to do as a result of the instruction. The tool used in making this determination is the needs assessment (Figure 1.1). The identified needs serve as the basis for the next step in the process: the specification of learning outcomes.

Rather than basing instruction on the content to be taught (the traditional approach) the educator should design all instructional activities in such a fashion as to bring about a specific student performance that has been identified beforehand. Performance objectives are written in such a way as to clearly define the conditions under which the performance is to take place, and tests are constructed to measure the extent to which the objectives have been realized.

The lesson itself is designed as a sequence of activities called instructional events. These external activities are calculated to bring about internal processes related to learning, such as motivation, retention, and recall.

Important aspects of lesson design are the selection and production of instructional materials. Both design factors and media type influence the effectiveness of these materials. As a general rule, *design* has to do with how well the message is interpreted, while *media type* relates to the kind of learning outcome being stressed. These two factors (design and media type) are discussed in greater detail in other chapters of this book.

Finally, various means are used to evaluate the effectiveness of the instruction. One source of data is the students' performance on the

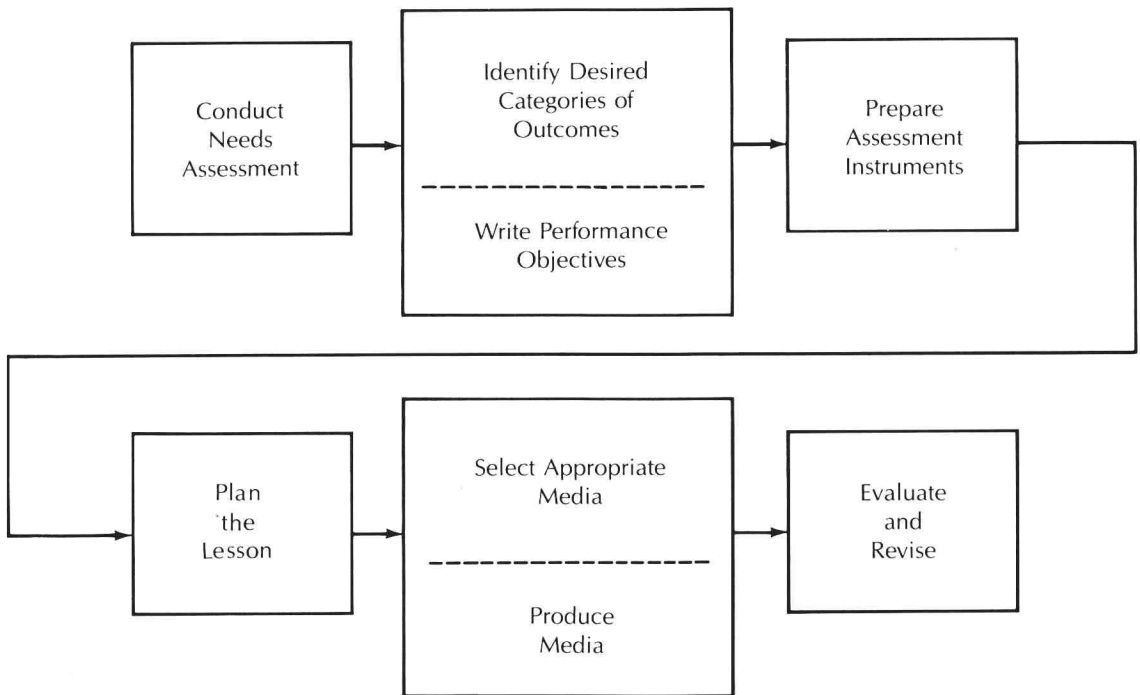


FIGURE 1.1
An instructional design model.

objective-based tests, but other sources might also be used. Revisions are then implemented to correct any weaknesses found in the system.

Having examined the model in a cursory fashion, let us now consider each of the stages in greater detail, beginning with needs assessment.

Needs Assessment

Simply stated, a need is the difference between what is and what should be. The determination of what should be is made by a variety of individuals and institutions. School boards spend much of their time identifying broad areas of need. School districts frequently establish performance criteria that all students must meet. These broad kinds of needs are typically referred to as *goals*, and, while they are useful to a degree, they are too global to be dealt with directly in the classroom. At a different level, student performance can be compared with measurable criteria to determine individual needs.

Many approaches to determining a need are used, but one of the most common is to give a test to a student, and then to compare the

actual with the desired performance. By no means should the term *test* be taken to mean only the traditional paper and pencil variety. In an art class, the test might take the form of mixing paints. When the operation of microcomputers is being taught, the test might involve the actual hands-on operation of the equipment.

Performance Objectives

The domains of learning outcomes Before the actual task of writing performance objectives is undertaken, it is necessary to become familiar with the various kinds of learning outcomes. Once a specific learning outcome has been identified, objectives can be precisely tailored to assure that the attainment of the desired behaviors will occur.

Gagné (1977) developed a taxonomy of learning outcomes that is useful in writing performance objectives and designing tests to evaluate the performance. This taxonomy includes simple verbal information learning and proceeds through more complex kinds of outcomes called intellectual skills. Also included are motor skills and affective or attitudinal domains. These are illustrated in Table 1.1. Note that another way to conceive of a domain is to think of it as a specific type of learning.

The student must perform in a different way in each of the categories to demonstrate proficiency. A standard set of capability verbs, as shown in Table 1.1, has been defined for use in writing objectives and tests in each of the domains (Gagné, 1977, Gagné and Briggs, 1979, Briggs and Wager, 1981).

The learning of verbal information involves **rote learning** in many cases, but it also includes what Briggs and Wager (1981) refer to as **non-verbatim learning** in which individuals state a fact in their own terms. A third category is **substance learning** in which the student is called upon to summarize an amount of information (such as a chapter in a book) in his or her own words.

TABLE 1.1
Learning outcomes and capability verbs.

Domains of Learning Outcomes	Standard Capability Verbs
Verbal information learning	List, recite, state, summarize
Discrimination skills	Discriminate
Concrete concepts	Identify
Defined concepts	Classify
Rule using	Demonstrate
Problem solving	Generate
Cognitive strategies	Originate
Motor skills	Execute
Attitudes	Choose