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ABSTRACT

A total, systematic, integrative concept provides the framework for this definition of educational technology as a theory, a field, and a profession. The definition statement presents an historical perspective of attempts to define educational technology and a current theoretical framework for arriving at a definition. It also identifies the intellectual techniques and practical applications derived from the theoretical framework and describes the training and certification, the ethics and standards, the leadership, the association and communications, the acknowledgement as a profession, the concern of the profession, and the relationship to other professions that both derive from the theoretical framework and exist in the field today. An evaluation of the definition statement concludes this document by the AECT Task Force on Definition and Terminology; a list of references and a glossary of terms not defined within this definition statement are appended. (Author/BK)

# THE DEFINITION OF EDUCATIONAL TECHNOLOGY

AECT Task Force
on Definition and Terminology



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*dedication*

*For James D. Finn and Sidney C. Eboch,*
*who are not here to see*
*that the pioneering work begun*
*over 15 years ago*
*is still continuing.*

*We miss them for the talents*
*they could have lent to this edition.*
*But more than that,*
*we miss them for themselves.*
*They were helping,*
*caring persons*
*who brought so much to the lives they touched.*

*As we carry on what they began,*
*we freely and lovingly acknowledge our debt*
*and gratitude*
*to them.*

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# Table of Contents

# Preface

> . . . I firmly believe that the future of educational technology is now in the hands of the thinkers. What is needed is a handful of experienced people, who have thought widely and deeply, and who are literally obsessed by the problems posed. These people must have the ability to analyze and synthesize, and, in effect, to *invent whole new conceptual frameworks.* If they do not have this latter ability, they will be soon reduced merely to improving what is.
>
> I think this radical rethinking is both a lonely and a high-risk activity. (Lewis, in Hawkridge, 1976, pg. 27; italics added)

The Association for Educational Communications and Technology shares this belief, and consequently has, for the past six years, engaged in the lonely and high-risk activity of attempting to define *educational technology* as a theory, a field, and a profession, and to identify and define terms used in *educational technology.*

This document, *The Definition of Educational Technology,* and the document *Educational Technology: A Glossary of Terms,* are the result of that activity.

## OFFICIAL ENDORSEMENT

By a unanimous vote of the Executive Committee for its Board of Directors, the Association for Educational Communi-

cations and Technology endorses this definition of educational technology as its *official* definition.

The Association is committed to a continuous reevaluation of the Definition, and to revising and republishing it within five years, to reflect changing concepts, terminology and definitions in the growing field and profession of educational technology.

## NEW CONCEPTUAL FRAMEWORK

In its activity of defining educational technology, the Association did ". . . invent a whole new conceptual framework." It based the definition on the framework of the concept of educational technology and on a model called the Domain of Educational Technology. This framework was chosen because it was seen as being: (a) integrative, rather than delimiting, in orientation; (b) present and future, rather than merely present, oriented; (c) process, as well as product, oriented; (*d*) theoretically, rather than "job" based, and (e) consistent with the current and future state of society and education. (The specific assumptions and concepts underlying the definition and its framework are presented in Chapter IV.

The Association recognizes that the framework presented here is new, and thus may be initially strange, uncomfortable, and perhaps even threatening, to some readers. Some readers may initially prefer other existing conceptual frameworks to the one presented here.

However, the Association believes that:

(a) this is the best conceptual framework available at this time for defining educational technology.
(b) this conceptual framework can be easily understood and applied by its members; and,
(c) other conceptual frameworks can, with some analysis, be seen to fit within the conceptual framework offered here.

## OTHER EXISTING FRAMEWORKS

The Association recognizes that there are, at present, several other sets of conceptual frameworks which are prevalent among

people involved in some way in educational technology.

These concepts include "audiovisual instruction," "educational media," "learning resources," and "educational communications."

It is the belief of the Association that while these are all valid approaches to looking at what we do, "educational technology" is more inclusive and integrative than these other approaches. However, these approaches and those who honestly hold them are to be respected.

It is also the belief of the Association that people who hold these concepts and frameworks will see, as they read this Definition, that they are a part of the total, systematic, integrative concept of educational technology as used here. This notion is especially addressed and further explained in Chapter X, p. 135. In this definition statement, the reader who is unsure about how his/her concept and framework fit into the one used in this Definition should pay careful attention to this section, reading it to answer the question, "How do I, and my concepts and beliefs, fit into the one used here?"

## SUMMARY

As a result of 14 years of work, the Association has developed and officially endorsed a definition of educational technology. It is based on a new conceptual framework which the Association believes is the best available at this time for defining the theory, field, and profession of educational technology.

It recognizes that other theoretical frameworks do exist, and that these are valid, but that they are part of the more inclusive theoretical framework of educational technology used in this definition.

Terms not defined within the definition statement are defined in Appendix A, Theory.

Definitions of terms related to educational technology are included in the publication *Educational Technology: A Glossary of Terms.*[1]

The Association offers this Definition and Glossary, then, as

its current position based on the most accurate and complete knowledge currently available. It is committed, however, to a continuous reevaluation of the Definition, and to revising and republishing it to reflect changing concepts, terminology and definitions in the growing field and profession of educational technology.

A document of this magnitude can only be produced as the result of the dedication and effort of the persons who formed the committee and of its chairperson, Ken Silber. Without their energies, skill, perserverance, and willingness to risk stating their perceptions of the field in this format we could not have offered this document. Whether or not we all agree with the statements presented here, they will provide a benchmark and a point of dialogue for further development of the field which seeks to provide effective learning experiences.

Portland, Oregon
July 14, 1976

Richard Gilkey, President
Association for Educational
Communications and Technology

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[1]The definition statement and a glossary of terms related to the development and production of learning resources were originally published as one document, *Educational Technology: Definition and Glossary of Terms, Volume I* (1977). The Glossary has since been expanded to include those terms related to the management of learning resources, and published in its completion as a separate document entitled *Educational Technology: A Glossary of Terms* (1979).

# Foreword

Any attempts at definition and terminology are undergirded by a philosophy of and assumptions about *homo sapiens*. For it is humans who conceptualize, organize, and plan. James Finn often referred to Bode, saying "The nature of instruction depends on assumptions about the nature of mind . . . and man."

As people—humankind—engage in their continual search for truth they think, they organize, they structure their world—making the real world to the likeness of their thoughts. Thus this definition is another step, another conceptualization built on the world of those who went before. It represents a point in time, a today based on yesterday and looking toward tomorrow.

Since this growth process is continual, Finn's (1963) insights about definition and terminology are as valid today as they were a decade ago. In his foreword to DAVI's monograph (Ely, 1963) on definition and terminology Finn said:

> The subject matter presented here—definition and terminology in the rapidly growing and swiftly changing field of instructional technology—certainly fits the requirement of importance. And insofar as terminology can be borrowed or created and agreed upon, it can bring much needed stability to the field.

A *field*, as George Gerbner has so often pointed out, is not the same thing as a *discipline* in the world of the intellect. The audiovisual field, like many other fields including public administration, embraces portions of concepts, skills, and procedures from a number of academic disciplines and also from other applied fields and welds them into new applications. In this process, other elements—notably, the beginnings of one or more new disciplines and a great deal of art—are created. Thus, civil engineering is more than the strength of materials, more than theories of molecular resonance; though it must use these, it must also create elements of its own if real bridges of lasting beauty are to be made to cross real rivers.

In the academic disciplines—chemistry, literary criticism, or urban sociology—definition and terminology is a difficult enough problem. These days, all academic disciplines are in a great struggle to become *sciences* with physics as the model. Without commenting on the possible inadvisability of this drive by all fields of knowledge to emulate a system for study of the physical universe, the fact still remains that in any science an agreed-upon universe of discourse is the *sine qua non*. The ideal science or academic discipline is one in which all workers understand perfectly all of the terms in the special language of the science or discipline—a language in which all neophytes or apprentices must be inducted until they, too, reach full understanding. Because models created of the real world rarely, if ever, precisely resemble that world, even the utmost reaches of the "hardest" sciences have never really attained this ideal of a totally agreed-upon universe of discourse.

The problem of an applied field with reference to definition and terminology is infinitely more difficult than the same problem in a narrow and precise discipline. An applied field, by its very nature, draws upon so many sources for its sustenance that the problem of definition and terminology is compounded many times. If the biophysicists do not totally agree in their field, what about the public health people who must apply findings from varied disciplines?

> Further, it can be argued that an applied field is subject to the winds of change that may mount to hurricane force and speed. The explosion of knowledge causes the narrowest discipline to change with great rapidity. A human profession making use of several disciplines thus has to live with multiplying change.
>
> At bottom, the problem is even more complicated. Writers on science and even eminent scientists in recent years have created and maintained a myth that there is a one to one relationship between a science and any applied field depending upon that science. That is, scientists advance new theories or discover new facts or processes about some aspect of the world, and engineers then apply these theories, facts, or processes directly as handed down. In education, for example, there is talk about the science of learning and the art of teaching or the technology of instruction.
>
> It is true that in the last 50 years, as the industrial revolution has given way to the scientific revolution, we have increasingly relied upon the scientist as discoverer and understander and upon the practitioner as direct applier without change or question. Their relationship, however, is still far from one to one. The practitioner—be he doctor, engineer, public administrator, or audiovisual director—still adds much to the revolutionary process: Call it invention, technology, art, or a little of all three.
>
> The professional who has to do something in this world further complicates the problem of language, definition, and terminology because he adds terms, concepts and ideas to those selected from the supporting disciplines (pp. iv-vi).

AECT's Task Force on Definition and Terminology has the responsibility for giving both structure and sense to the application of technology to education. Applying technology necessarily affects all parts of the educational enterprise. Finn recognied the scope of this impact:

> It follows, then, that definition and terminology in the expanded audiovisual field—instructional technology, if you will—is of crucial importance to the educa-

> tional community as a whole. Does the school superintendent, for example, know what the language laboratory that he has just asked for bids on really is? Does he use *program* in its television sense or its teaching machine or computer sense? (p. vii)

How does instructional design relate to instructional development and how do both relate to curriculum planning? Do summative and formative evaluation differ in respect to time or procedures or both? The need for standard terms and definitions has expanded—not diminished—in past years.

This definition is not offered casually. It has been 14 years in the making. It is the product of people—practitioners in educational technology. Recognizing what is encompassed within the field of educational technology, they represent and have drawn from a wide range of educational specialities. As a product of people at a point in time, the definitions and technology will change and evolve as time goes on. Such changes are welcomed, not discouraged. AECT's Task Force on Definition and Terminology encourages those involved in any phase of educational technology to make themselves heard, to offer comments and ideas, to contribute to an ongoing revision process. Future editions can only be strengthened by the collective input of you, the practitioners in educational technology. Tomorrow is you—become it.

Rochester, New York
January 1, 1977

Clint Wallington

# THE DEFINITION OF EDUCATIONAL TECHNOLOGY

# CHAPTER 1

# The Definition of Educational Technology: A Summary

A concept as complex as educational technology requires an equally complex definition. The following definition—all 16 parts—are meant to be taken as a whole; none alone constitutes an adequate definition of educational technology.

1. *Educational technology* is a complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems and devising, implementing, evaluating, and managing solutions to those problems, involved in all aspects of human learning. In educational technology, the solutions to problems take the form of all the *Learning Resources* that are designed and/or selected and/or utilized to bring about learning; these resources are identified as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems, and devising, implementing and evaluating solutions are identified by the *Educational Development Functions* of Research-Theory, Design, Production, Evaluation-Selection, Logistics, Utilization, and Utilization-Dissemination. The processes of directing or coordinating one or more of these functions are identified by the *Educational Management Functions* of Organization Management and Personnel Management. The relationships among these elements are shown by the Domain of Educational Technology Model:

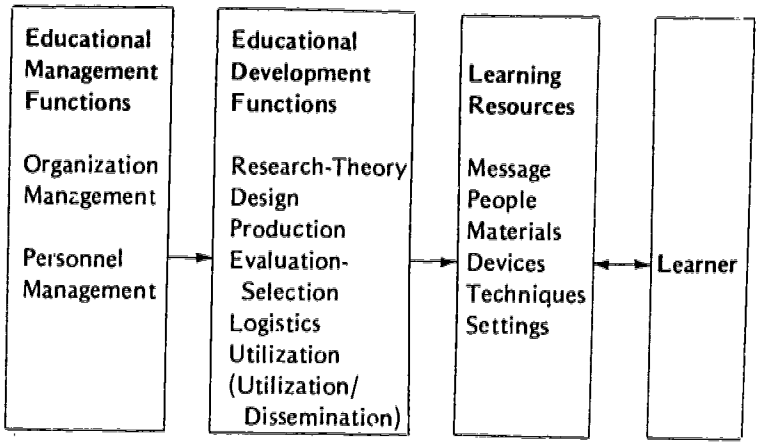



Figure 1.1
DOMAIN OF EDUCATIONAL TECHNOLOGY

The definitions of the elements in the Domain of Educational Technology are given in Tables 1.1, 1.2, and 1.3.

Educational technology is a theory about how problems in human learning are identified and solved.

Educational technology is a field involved in applying a complex, integrated process to analyze and solve problems in human learning.

Educational technology is a profession made up of an organized effort to implement the theory, intellectual technique, and practical application of educational technology.

2. Educational technology is often confused with "technology in education."

*Technology in education* is the application of technology to any of those processes involved in operating the institutions which house the educational enterprise. It includes the application of technology to food, health, finance, scheduling, grade reporting, and other processes which support education within institutions. Technology in education is *not* the same as educational technology.

3. Educational technology is often confused with "instructional technology."

*Instructional technology* is a sub-set of educational technology, based on the concept that instruction is a sub-set of education. Instructional technology is a complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems, and devising, implementing, evaluating and managing solutions to those problems, in situations in which *learning is purposive and controlled.* In instructional technology, the solutions to problems take the form of *Instructional System Components* which are prestructured in design or selection, *and* in utilization, and are combined into complete instructional systems; these components are identified as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems and devising, implementing, and evaluating solutions are identified by the *Instructional Development Functions* of Research-Theory, Design, Production, Evaluation-Selection, Utilization, and Utilization-Dissemination. The process of directing or coordinating one or more of these functions are identified by the *Instructional Management Functions* of Organization Management and Personnel Management. The relationships among these elements are shown by the Domain of Instructional Technology Model:

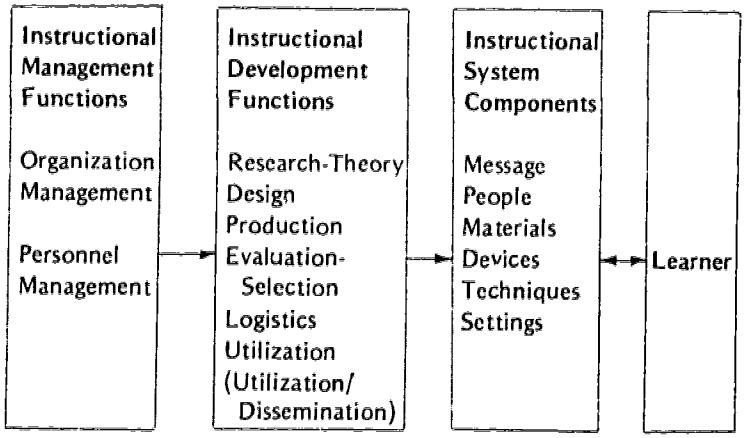



Figure 1.2
DOMAIN OF INSTRUCTIONAL TECHNOLOGY

The definitions of the elements in the Domain of Instructional Technology are given in Tables 1.1, 1.2, and 1.3.

Thus, all of instructional technology fits within the parameters of educational technology, while all of educational technology does not fit within the parameters of instructional technology. If instructional technology is in operation, then of necessity, so is educational technology; the reverse is not necessarily true. In educational technology, the Development and Management Functions are *more inclusive* because they apply to more Learning Resources than just Instructional System Components—they include all resources that can be used to facilitate learning.

4. The definition of educational technology constitutes a Theory because it meets the criteria of: existence of a phenomenon, explanation, summarizing, orientation, systematizing, gap identification, generating strategies for research, prediction, and a principle or set of principles.

5. Educational technology has a unique Intellectual Technique—an approach to solving problems. Each development and management function has an individual technique associated with it. However, the intellectual technique of educational technology is more than the sum of these parts. It involves the systematic integration of the individual technologies of these functions, and their interrelationships, into a complex, integrated process to analyze whole problems and create new solutions. It produces a synergistic effect, yielding outcomes not totally predictable based on the individual elements operating in isolation. This indigenous intellectual technique is unique to educational technology; no other existing field uses it.

6. Educational technology has practical applications. The existence of resources for learning, and the performance of the development and management functions, constitute the most basic and explicit evidence of this practical application. In addition, the application of educational technology affects the organizational structure of education because: (1) it moves the impact of educational technology to the curriculum strategy (and perhaps determination) level; (2) it permits four types of educational patterns—people resources alone, other resources

used by (and controlled by) people, people in shared responsibility with other resources (combined into educational systems using mediated instruction), other resources (mediated instruction) alone; (3) it makes possible the existence of alternative institutional forms for facilitating learning, and can serve all these types of alternative institutions. These applications have significant impact on the specific processes of education: they change the techniques of doing, and the people who do, content determination (including standardization, choice, quantity, and quality), design, production, and evaluation of instruction, and interaction with, and assessment of, learners. The result leads to a drastic change in the role of school systems and the individual teacher.

7. Educational technology has guidelines for training and certification. There is a competency-based framework for training people who perform tasks in educational technology. The framework is based on groupings of tasks from various functions within the domains of educational and instructional technology. The groupings reflect specialties within the field as well as levels of performance within the specialty area. The specialties are: (1) instructional program development, (2) media product development, and (3) media management. The three levels of task complexity are aide, technician, and specialist. AECT currently has guidelines for training programs for, and certification of, technicians and specialists in each of the three specialty areas, and is developing procedures for the implementation of those guidelines.

8. Educational technology has provisions for the development and implementation of leadership. Leadership within the profession is carried out through various leadership conferences and internship programs. In addition, educational technology fulfills a leadership function in the field of education through participation in joint groups, grants, and publications.

9. Educational technology has an association and professional communications. There is at least one professional association directly concerned with educational technology—the Association for Educational Communications and Technology. In addition to facilitating communication among members through its

annual convention and three periodic publications, it serves to develop and implement the standards and ethics, leadership, and training and certification characteristics of the profession.

10. Educational technology acknowledges itself as a profession through its professional association and the activites it performs.

11. Educational technology operates within the larger context of society. It advocates being a concerned profession—concerned about the uses to which its techniques and applications are being put. Further, as a profession, it has taken stands in favor of intellectual freedom, in favor of affirmative action, against stereotyping in materials, and in favor of enlisting technology in support of humane and life-fulfilling ends.

12. Educational technology operates within the total field of education. In its relationship to other professions also involved in the field it advocates a coequal and cooperative relationship among these professions.

13. Since the definition presented here meets all the criteria for the existence of a theory (preceding items 1-4), educational technology is a theory about how problems in human learning are identified and solved. Since the definition meets all the criteria for the existence of a field (preceding items 1-6), educational technology is a field involved in applying a complex, integrated process to analyze and solve problems in human learning. Since the definition meets all the criteria for the existence of a profession (preceding items 1-12), educational technology is a profession made up of an organized effort to implement the theory, intellectual technique, and practical application of educational technology. The definitions of educational technology as a theory, a field, and a profession are congruent—with each being derived directly from the one which precedes it.

14. Persons are members of the field of educational technology if they perform activities that fall within the Domain of Educational Technology, based on the theoretical framework of, and employing the intellectual technique of, educational technology.

15. Persons are members of the profession of educational technology if they already meet the criteria for operating within the field; spend a majority of their time performing one or more of the Domain of Educational Technology functions; subscribe to the standards and ethics of the profession; and have the training and certification required by the profession; are involved in developing their own leadership abilities; are members of the association and participate in its communications through reading its journals and attending its meetings; acknowledge themselves as members of the profession; are concerned professionals—examining the ends to which their skills are put and accepting those values set forth by the profession; and relate to other professionals on a coequal and cooperative basis. These people may be called "educational technologists."

16. "The concept of instructional or educational technology is totally integrative. It provides a common ground for all professionals, no matter in what aspect of the field they are working. It permits the rational development and integration of new devices, materials, and methods as they come along. The concept is so completely viable that it will not only provide new status for our group, but will, for the first time, threaten the status of others" (Finn, 1965, p. 193).

"The educational future will belong to those who can grasp the significance of [educational and] instructional technology" (Finn, 1964a, p. 26).

## Table 1.1
## Learning Resources/Instructional System Components

*Learning Resources* (for Educational Technology)—all of the resources (data, people, and things) which may be used by the learner in isolation or in combination, usually in an informal manner, to facilitate learning; they include Messages, People, Materials, Devices, Techniques, and Settings. There are two types: (a) resources by design—those resources which have been specifically developed as "instructional system components" in order to facilitate purposive, formal learning, and (b) resources by utilization—those resources which have not specifically been designed for instruction but which can be discovered, applied, and used for learning purposes.

*Instructional System Components (ISC)* (for Instructional Technology)—those learning resources which are prestructured in design or selection *and* utilization, and combined into complete instructional systems, to bring about purposive and controlled learning.

| Resource or Component | Definition | Examples |
|---|---|---|
| Message | Information to be transmitted by the other components; takes the form of ideas, facts, meanings, data. | Any subject matter/content, *e.g.*, the history of the Greeks; Ohm's Law; World Series results; the parliamentary system of government; conjugation of the verb "to be." |
| People | Persons who are acting to store and/or transmit Messages. | Teacher; student; actor; speaker. |

Learning Resources/Instructional System Components

| Resource or Component | Definition | Examples |
|---|---|---|
| Material | Items (traditionally called media or software) which usually store Messages for transmission by devices; sometimes self-displaying. | Overhead transparency; slide; filmstrip; 16mm motion picture; 8mm motion picture; videotape; record; audiotape; programed instruction materials; computer-[illegible]ed instruction program; book; journal. |
| Device | Items (traditionally called hardware) which transmit Messages stored on Materials. | Overhead projector; slide projector; filmstrip projector; 16mm film projector; 8mm film projector; videotape recorder; television set; record player; radio; tape recorder; dial access information retrieval system console; teaching machine; talking typewriter; computer output devices. |
| Technique | Routine procedures or precast molds for using Materials, Devices, Settings, and People to transmit Messages. | Computer-assisted instruction; programed instruction; simulation; gaming; discovery; inquiry; field trip; team teaching; individualized instruction; self-instruction; group instruction; lecture; discussion. |
| Setting | The environment in which the Messages are received. | *Physical:* school building; instructional materials center; library; studio; classroom; auditorium. *Environmental:* lighting; heating; acoustics. |

Table 1.2
Educational/Instructional Development Functions

Functions which have as their purpose analyzing problems, and devising, implementing, and evaluating the Learning Resources/ Instructional System Components solutions to these problems.

| Function | Definition | Examples |
|---|---|---|
| *Research-Theory* Purpose: | To generate and test knowledge (theory and research methodology) related to the functions, Learning Resources and Instructional System Components and learners. | To conceptualize theoretical models.<br>To conduct research projects.<br>To analyze research data. |
| Outcome: | Knowledge which can act as an input to the other functions. | To generate new ideas.<br>To test validity of model.<br>To test hypotheses. |
| Activity: | Seeking information, reading it, analyzing it, synthesizing it, testing it, analyzing test results. | Reads proposal.<br>Compares model with known data.<br>Formulates specific hypotheses. |
| *Design* Purpose: | To translate general theoretical knowledge into specifications for Learning Resources or Instructional System Components. | To design programed instruction materials.<br>To develop instructional modules for individualized instruction.<br>To design equipment systems. |

Educational/Instructional Development Functions

| Function | Definition | Examples |
|---|---|---|
| Outcome: | Specifications for production of Learning Resources and Instructional System Components, regardless of format or resource. | To write general objectives.<br>To determine medium.<br>To describe technical systems. |
| Activity: | Analyzing, synthesizing, and writing objectives, learner characteristics, task analyses, learning conditions, instructional events, specifications for Learning Resources and Instructional Systems Components. | Analyzes objectives.<br>Synthesizes objectives/sequence/content/media.<br>Arranges materials in sequence. |
| *Production* Purpose: | To translate specifications for Learning Resources or Instructional Systems Components into specific actual items. | To produce audiotapes.<br>To direct motion picture.<br>To write computer programs for computer-assisted instruction. |
| Outcome: | Specific products in the form of test versions, prototypes, or mass-produced versions. | To make slides into test filmstrips.<br>To decide on music/sound effects.<br>To match audio and visuals. |
| Activity: | Operating production equipment, drawing, laying out, writing, building products. | Mixes narration tape and sound.<br>Sequences slides using viewer.<br>Operates motion picture camera. |

Educational/Instructional Development Functions

| Function | Definition | Examples |
|---|---|---|
| *Evaluation-Selection* Purpose: | To assess acceptability of actual produced Learning Resources or Instructional System Components in terms of criteria set by other functions, and to develop models for this assessment. | To pilot test prototype instructional materials.<br>To preview and select instructional materials.<br>To develop evaluation models and techniques. |
| Outcomes: | (a) Evaluation for Design: effectiveness of Learning Resources or Instructional System Components in meeting their objectives.<br>(b) Evaluation for Production: acceptability of items in meeting production standards.<br>(c) Evaluation for Evaluation: evaluation models.<br>(d) Evaluation for Selection: acceptability of items for acquisition for a specific purpose.<br>(e) Evaluation for Utilization: acceptability of items for meeting learning objectives in actual use. | To identify problems with materials.<br>To identify objectives not met.<br>To insure acceptable sound quality. |
| Activity: | Analyzing quality in terms of standards. | Observes students using materials.<br>Analyzes possible uses of materials.<br>Compares data and objectives. |

Educational/Instructional Development Functions

| Function | Definition | Examples |
|---|---|---|
| *Logistics* Purpose: | To make Learning Resources and Instructional System Components available for other functions. | To have equipment ready as needed.<br>To provide delivery service.<br>To catalog materials. |
| Outcome: | Ordered, stored, retrieved, classified, catalogued, assembled, scheduled, distributed, operated, maintained, and repaired Learning Resources and Instructional System Components. | To cross-index materials.<br>To locate materials for delivery.<br>To keep repair history.<br>To repair filmstrip projector. |
| Activity: | Ordering, storing, retrieving, classifying, cataloging, assembling, scheduling, distributing, operating, maintaining, repairing Learning Resources and Instructional System Components. | Threads movie projector.<br>Assigns media code from list.<br>Plans new scheduling system. |
| *Utilization* Purpose: | To bring learners into contact with Learning Resources and Instructional System Components. | To help student use learning activity.<br>To monitor individualized and self-instruction.<br>To help student select learning activities and to meet objectives. |
| Outcome: | Facilitation and assessment of student learning. | To analyze student learning style.<br>To present information.<br>To encourage interest in learning activity. |

Educational/Instructional Development Functions

| Function | Definition | Examples |
|---|---|---|
| Activity: | Assigning, preparing learner for, presenting, assisting, and following up Learning Resources and Instructional System Components; testing learners. | Discusses with student.<br>Compares learning activities with learning style.<br>Compares pre- and post-tests. |
| *Utilization-Dissemination* Purpose: | (A special subfunction of Utilization.) To bring learners into contact with information about educational technology. | To consult on materials design and use.<br>To teach photography course.<br>To explain individualized instruction project.<br>To increase use of learning resources center services by teachers. |
| Outcome: | Dissemination of information about educational technology. | To provide models for designing instruction.<br>To improve use of mediated instruction by teachers.<br>To answer questions about individualized instruction project.<br>To demonstrate projector.<br>To explain learning resources center services to teachers. |
| Activity: | Taking in and giving out information about educational technology. | Defines learning resources center services available.<br>Writes professional articles.<br>Views microteaching lesson.<br>Role plays teacher using mediated instruction. |

Table 1.3
Educational/Instructional Management Functions

Functions which have as their purpose the directing or controlling of one or more of the Educational/Instructional Development Functions or of other Educational/Instructional Management Functions to ensure their effective operation.

| Function | Definition | Examples |
|---|---|---|
| *Organization/Management* | | |
| Purpose: | To determine, modify, or execute the objectives, philosophy, policy, structure, budget, internal and external relationships, and administrative procedures of an organization performing one or several of the Development functions or the Management functions. | To administer/direct project which includes two or more functions.<br>To monitor and change operation of center.<br>To provide secretarial services in an audio-visual center. |
| Outcome: | Policy, budget, plans, coordinated activities, administrative operations. | To prepare budget.<br>To identify organization needs.<br>To ascertain jobs to be done. |
| Activity: | Defining, writing, and carrying out procedures leading to the outcomes. | Reviews purchase orders.<br>Designs new organizational model.<br>Analyzes problems in project. |

Educational/Instructional Management Functions

| Function | Definition | Examples |
|---|---|---|
| *Personnel-Management*<br>Purpose: | To interact with and/or to supervise the people who perform activities in the functions. | To supervise personnel in graphics unit.<br>To improve communications between technicians and artists.<br>To staff projects |
| Outcome: | Interpersonal interaction, discussion, supervision, employment, and personal development. | To evaluate work performed.<br>To encourage discussion.<br>To supervise the repairperson. |
| Activity: | Discussing with and speaking to other people. | Negotiates with personnel department.<br>Questions applicants.<br>Talks with new employees. |

# CHAPTER II

# Educational Technology: Theoretical Construct, Field, Profession

When we think of educational technology, we can think of it in three different ways—as a theoretical construct, as a field, and as a profession. Consequently, when we define educational technology, we can define it in these same three different ways.

Before stating a definition, then, it is prudent to analyze each of these ways of looking at educational technology, to decide which we are to define, and to set forth criteria by which we can evaluate whether our definition actually defines educational technology in the desired ways.

## THREE PERSPECTIVES OF EDUCATIONAL TECHNOLOGY

The first way we can think of educational technology is as a *theoretical construct*—an abstraction which includes sets of ideas and principles about how education and instruction should be carried out through the use of technology.

Second, we can think of educational technology as a *field of endeavor*—the application of the theoretical ideas and principles to solve actual problems in education and instruction. The field includes the techniques used, the activities performed, the information and resources used, and the clients served by practitioners in the field.

Third, we can think of educational technology as a *profession*—a special group of practitioners who are organized, who meet certain criteria, who have certain duties, and who combine to structure a particular part of the field.

None of the foregoing perspectives is more correct or better than the others. Each is a different way of thinking about the same thing. Different people have different perspectives and individuals' perspectives may change, depending upon what they "do" in relation to educational technology.

## DEFINING EDUCATIONAL TECHNOLOGY

Which of these three perspectives of educational technology should be used as the basis for the definition?

Thinking of educational technology as a theoretical construct provides the most substantial basis for a definition. We can consider it in the abstract, analyzing, identifying, and defining its elements and interrelationships, then synthesizing them into a cohesive entity. Such a definition would be the most clear and comprehensive definition which could be generated.

Most people, however, think of educational technology as a field, and identify it not by its theory but rather by those tangible elements they can observe. Those who work to apply educational technology generally relate it to the jobs and the activities they perform daily. To them it is not a theory but an entity in which they exist. A definition of the field of educational technology would most closely fit the perceptions of those who work within it.

A still smaller group of people think of educational technology as a profession, and identify it by the special criteria for professions. While these people are concerned with the jobs and activities of the field, they are also concerned with the criteria (such as training, belonging to an organization) which make them "professionals" and which make educational technology their "professional home." A definition of the profession of educational technology would address itself more to the question of "who is an educational technologist?"

To select any single viewpoint to the exclusion of the others as the basis for the definition would limit both the scope and utility of the definition.

Therefore, the definition of educational technology presented here will define educational technology from all three perspectives. It will define educational technology as a theoretical construct—showing the ideas and principles and how they are synthesized into a cohesive entity; as a field—showing its applications in and implications for the real world; and as a profession—identifying the criteria for this special group within the field.

Defining educational technology from all three perspectives is not enough, however, for an adequate definition. In addition, the definition must directly relate these three viewpoints into a coherent whole. To do this, it must make the definitions of the theoretical construct, the field, and the profession *congruent*. The definition must clearly show how the field derives from, and relates to, the theoretical construct, and how the profession derives from and relates to the field. Without such congruence, the definition would be unusable.

## REQUIREMENTS FOR THE DEFINITION

To achieve this congruence, and subsequent utility, it is necessary to establish the criteria for defining a theoretical construct, a field, and a profession—requirements which ensure that the definitions interrelate. This is best done by beginning with the most extensive list of requirements—those for defining a profession—and then by identifying which of these requirements are necessary for defining the field, and then a theoretical construct.

These requirements are best spelled out in the list of "Characteristics of a Profession" first identified by Finn and later modified by Finn, AECT, and Silber. They are:

an organized body of intellectual theory, constantly expanding by research;

an intellectual technique;

an application of that technique to practical affairs;

a long period of training and certification;

a series of standards and a statement of ethics which is enforced (Finn, 1953);

the ability to exercise its own leadership (Finn, 1960a);

an association of members of the profession into a closely knit group with a high quality of communications among members (Finn, 1953);

acknowledgement as profession (Silber, 1974);

professional concern for responsible use of its work;

an established relationship with other professions (AECT, 1972).

The characteristics required for defining a theoretical construct, a field, and a profession are identified in the following sections, along with a more detailed explanation of each characteristic.

## DEFINING A THEORETICAL CONSTRUCT

To define educational technology as a theoretical construct, only the first of the above characteristics is required: an organized body of intellectual theory, constantly expanding by research. According to Finn (1953, p. 8):

> . . . the most fundamental and most important characteristic. . . is that the skills are founded upon a body of intellectual theory and research. Furthermore, this systematic theory is constantly being expanded by research and thinking within the profession. As Whitehead says, ". . . the practice of a profession cannot be disjoined from its theoretical understanding or *vice versa* . . . . The antithesis to a profession is an avocation based on customary activities and modified by the trial and error of individual practice. Such an avocation is a Craft . . . ." (Smith *et al.*, 1951, p. 557)

If the definition of educational technology is to meet this requirement, it must meet the requirements for a theory.

*Definition of Theory.* The term "theory," while often used colloquially as an antonym for the terms "practice" or "practical," has a precise meaning:

> 1. a general principle, supported by considerable data, proposed as an explanation of a group of phenomena; a statement of the relations believed to prevail in a comprehensive body of facts (English & English, 1958, p. 551),

2. a principle or set of principles that explain a number of related facts and predict new outcomes based on these facts (Wheeler *et al.*, 1975, p. 638).

*Characteristics of a Theory.* Based on these definitions, and other writings about theories (Klausmeier & Goodwin, 1966; Heinich, 1970; Arnoult, 1972), the following characteristics of a theory can be identified:

existence of a phenomenon—there must be some extant phenomenon not completely understood in terms of current knowledge;

explanation—a theory provides an explanation of why or how the phenomenon occurs (as opposed to simple confirmation of its existence);

summarizing—a theory summarizes what is already known about relationships among a large body of empirical information, concepts, and generalizations;

orientation—defines and narrows the facts to be studied as well as distinguishing relevant and irrelevant data;

systematizing—provides a scheme by which the relevant phenomena, postulates, and laws are systematized, classified, and interrelated;

gap identification—points out areas which are relevant but which have been ignored or not resolved at the present as well as identifying areas for future study;

generate strategies for research—provides a basis for formulating new hypotheses and carrying out further research based on the explanation;

prediction—goes beyond empiricial data and what is known to enable extrapolation and prediction of new facts and hypotheses that are at present unknown.

If the definition demonstrates the existence of a phenomenon that is not currently understood; explains, summarizes, orients, systematizes, identifies gaps related to the phenomenon; generates strategies for research about it; and makes predictions about it; then the definition meets the requirements for being a theory.

## DEFINING A FIELD

> A field is a sphere of activity which "embraces portions of concepts, skills, and procedures from a number of academic disciplines and also from other applied fields and welds them into new applications." (Finn, 1963, p. iv-v, quoting Gerbner)

In order to meet the requirements for defining a field, the definition of educational technology must meet: the requirements for defining educational technology as a theory; two additional characteristics of a field—intellectual techniques and practical application, and the characteristic of uniqueness.

*Intellectual Technique.* An intellectual technique is the approach used to solve problems—the manner in which an individual searches for solutions. Gagne and Briggs (1975) would call intellectual technique a cognitive strategy—the process that controls internal thinking processes and brings them to bear in certain ways to solve problems. Intellectual technique serves as the bridge between theory and practical application.

*Practical Application.* Practical application involves making thoughts, ideas, and processes operational. It results in tangible products. For example, a person actually performing a scientific experiment or carrying out the steps of the instructional development process is making a practical application of intellectual technique.

In addition, practical application indicates how the intellectual technique is to be put into operation in the context of the organizational structures and institutions in which the field operates.

*Uniqueness.* Since the definition above indicates that a field welds intellectual techniques and practical applications into new applications, the intellectual technique and practical application identified by the definition must be unique to the field. They must be characteristics found in no other field. If the definition leads to a unique intellectual technique and unique practical applications, then the field it defines can be said to be unique.

Thus, the definition of educational technology as a field must first define it as a theoretical construct, then identify an intel-

lectual technique and a practical application, and demonstrate that these are unique to the field of educational technology.

## DEFINING A PROFESSION

To define educational technology as a profession, the requirements for defining a theoretical construct and a field must first be met. Then the definition must meet all the other characteristics of a profession.

*Training and Certification.* Periods of long training are needed to develop specialists and technicians in the profession. There must be some specification of "the nature of the training either through state regulation of some sort or through a system of accrediting training institutions . . . . [Training includes] The nature and content of professional education . . . certification standards, admission standards and practices, and placement." (Finn, 1953, pp. 9, 10)

*Standards and Ethics.* Statements of ethics indicate how members of the profession should behave. Sets of standards specify guidelines for the materials, devices, and facilities used by people in the profession. "However, the publication of codes of ethics and manuals of standards in itself guarantees nothing. Professionalization occurs when enforcement is possible and vigorous." (Finn, 1953, p. 12)

*Leadership.* Leadership is necessary to "seize the present and bend the future to proper ends." However, to avoid the circumstance that "many of the recent innovations that are giving us headaches today have been forced upon us from the outside," this leadership must come from within the profession. To exercise its own leadership, the profession must "know our own posture . . . where we want to go and why." (Finn, 1960a, p. 224)

*Association and Communication.* A strong organization of people in the profession is needed in order to develop and implement the other characteristics—especially standards and ethics, leadership, and training. It is the existence of a strong association which makes possible the "vigorous enforcement" of practices, standards, and ethics.

It is also needed to facilitate communication among members of the profession, communication which "is carried on by meetings, journals of high quality, consultations, and other means." (Finn, 1953, p. 8)

*Acknowledgement as a Profession.* The members of a profession must believe that there is a profession and that they are members of it. The existence of a profession cannot be mandated or thrust upon practitioners. They must want the profession to exist and acknowledge that it does so. They must acknowledge that they are members of the profession. This acknowledgment is manifested by the formation or existence of an association, by the presence of the other characteristics of a profession, and by public acknowledgment of practitioners that there is a profession of which they are members.

*Professional Concern.* It is not sufficient that a profession uses its intellectual technique in practical application. Additionally, the profession must be responsible in its use. The profession must be concerned about the uses to which its work is put in society. It must continuously examine the values for which it stands, and, if appropriate, take positions on societal issues affected by its work. (AECT, 1972)

*Relationship to Other Professions.* There may be more than one profession operating within the field. Each of these professions is related—either explicitly or implicitly—to other professions operating in the field. These relationships must be acknowledged, identified, and developed.(AECT, 1972)

## ORGANIZATION OF THE DEFINITION

Since the characteristics provide, in sequence, the requirements for defining a theoretical construct, a field, and a profession, they will be used as the organizing framework for the definition.

The requirement for defining a theoretical construct will be addressed first. Chapter III, "Expanding Theory—Historical Perspectives," will review the past definitions and theories of educational technology. Chapter IV, "Expanding Theory—The Current Theoretical Framework," will present the current definition and theory of educational technology

The requirements for defining a field will be analyzed next in Chapter V, "Intellectual Technique—Functions, Systematic Application of a Combination of Technologies, Synergistic Effect," and in Chapter VI, "Practical Application—Resources and Functions, Effects on Organizational Structures; Effects on Processes of Education."

The requirements for defining a profession will be addressed in Chapters VII—IX. Training will be considered in Chapter VII, "Certification and Training." Standards and ethics, leadership, association, communications, and acknowledgement as a profession will be discussed in Chapter VIII, "Professional Associations." Finally, the concerned profession and its relationship to other professions will be examined in Chapter IX, "Societal Context—Concerned Profession, Humanism, Relationship to Other Professions."

The concluding chapter will evaluate the definition presented and present conclusions in terms of how well the requirements for defining a theoretical construct, a field, and a profession are met. It will then address the question of who is in the field and the profession.

# CHAPTER III

# Expanding Theory– Historical Perspectives

## INTRODUCTION

> The history of the field of instructional technology is rich in definitions and models of what the field is about, perhaps too rich at times. Much of the confusion about instructional technology comes from the plethora of definitions. (Wallington, 1974, p. 15)

The definition herein is certainly not the first attempt to address itself to the first characteristic of a profession—theory and research. While previous definitions, models, and theories of educational technology are not adequate for today (Finn, 1953, 1960a; Wallington, 1974), they are nonetheless important for two reasons. First, they show the development of the concepts used in educational technology from its inception. Second, they contain some concepts which are incorporated into, or built upon by, the current definition.

This chapter, therefore, will review the major historical definitions, theories, and models of educational technology. The review will not be exhaustive, as was Saettler (1968), but rather will concentrate on major periods in the history of educational technology, drawing from those periods concepts useful for the current definition.

## BEGINNINGS

> Ours is a knowledge generating culture with its birth in the second Industrial Revolution, the age of automation, the age of atomic power. Instructional technology is related to this development and could be thought to have begun in the early 1920's. (Finn, 1967)

> Educational technology is essentially a young field of study. Saettler (1968) traced the philosophical underpinnings of educational technology to the Sophists of the Golden Age of Greece. While such a link may be historically valid and give credence to educational technology as an ancient and venerable field of endeavor, it is not operationally relevant. (Wallington, 1974, p. 15)

This historical overview uses Finn's dating of the 1920's as the beginning of educational technology, and will start with the first formal movement and definition related to educational technology, visual instruction.

## VISUAL INSTRUCTION

> A visual aid is any picture, model, object, or device which provides concrete visual experience to the learner for the purpose of (1) introducing, building-up, enriching, or clarifying abstract concepts, (2) developing desirable attitudes, and (3) stimulating further activity on the part of the learner . . . . Visual aids are classified according to general types along a scale of concreteness and abstraction. (Hoban, Hoban, and Zisman, 1937, pp. 9-10)

> This was the first comprehensive textbook in visual instruction and the first to be concerned with the *integration* of visual materials with the school curriculum. (Saettler, 1968, p. 153, about Dorris, Anna V., *Visual Instruction in the Public Schools.* 1928; italics added)

The visual instruction movement was based on the concept of using visual materials to make more concrete the abstract ideas being taught. In addition to the concept of "concreteness," the visual instruction movement introduced two other concepts which are still useful.

First, it introduced the idea of classifying, rather than listing, the types of "visual aids." Second, it emphasized the need to integrate the visual materials with the curriculum, rather than using them in isolation.

One of the movement's weak points, however, was its emphasis on the materials themselves, with a lack of emphasis on the design, development, production, evaluation, and management of the materials. This is not to say that these activities were not considered—merely that they were of secondary importance to the main focus, the materials themselves. Another weakness was that it saw visual materials as an "aid" to the reader rather than as providing units of instruction by themselves.

While most of the research carried out by the visual instruction movement dealt with surveys of equipment, materials, and teacher training (see Saettler, 1968) at least one study (Judd, 1923) attempted to assess the effectiveness of utilizing visual aids.

> Much work needs to be done in educational experimentation and research having for its purpose the discovery and development of the best methods for using motion pictures in teaching. (p. 8)

With the advent of sound recording and sound motion pictures, the visual instruction movement expanded to include sound.

## FROM VISUAL INSTRUCTION TO AUDIOVISUAL INSTRUCTION

> In a technical sense *audio-visual instruction* is a term used to designate an extensive variety of devices . . . which are used by teachers to transmit ideas and experiences through the eye and the ear . . . . The chief distinction between audio-visual instruction and other forms of instructional technique is a matter of emphasis. *Audio-visual instruction* emphasizes the value of concrete or nonverbal experience in the learning process, whereas other forms of instruction stress verbal or symbolic experience . . . . *Audio-visual instruction should not be regarded as a method of teaching.* Audiovisual materials are of value only when used as an integral part of the instructional process. (McClusky, 1949, p. 6)

> Audiovisual materials and devices should not be classified exclusively as "eye" and "ear" experiences. They are modern technological means of providing rich, concrete experiences for students. (Dale, Finn, and Hoban, 1949, p. 253)

While the audiovisual instruction movement added the "audio" component to the materials of the visual instruction

movement, it added little conceptually. It kept the notions of the abstract-concrete continuum (with audiovisual materials at the more concrete end) and of classifying, rather than listing, types of materials. These concepts were put into their most concrete form in the Cone of Experience (Dale, 1954). It also continued to emphasize the idea that audiovisual materials needed to be integrated into the curriculum.

The audiovisual instruction concept also continued the two basic weaknesses of the movement from which it evolved. It was more concerned with the materials than with the processes of developing them, and it continued to view audiovisual materials as aids to teachers' instruction.

There was, however, a good deal of research conducted regarding the effectiveness of audiovisual materials and about which types of materials worked "best" (Hoban and van Ormer, 1950; Dale, Finn, and Hoban, 1949).

By the end of World War II, a new trend had begun in the audiovisual field—a change of perspective from audiovisual to two parallel new conceptual frameworks, communications theory and early systems concepts.

## FROM AUDIOVISUAL INSTRUCTION TO COMMUNICATIONS

> A fruitful approach to better understanding and greater efficiency in the audiovisual field seems to lie in the concept of *communications.* (Hoban, 1956, p. 9)

> . . . We are concerned with communication; we are interested in the answer to the question, "What does it mean to communicate?"
>
> As I think about the effectiveness of audio-visual materials, I find that reading and thinking about communications are one of my most fruitful methods of evaluation. In short, I ask myself: "What broad theories of communication can I operate under which will be most helpful to me . . . ." (Dale, 1953, p. 3)

The communications orientation to educational technology altered the theoretical framework of the field. Instead of concentrating on the "things" of the field, it concentrated on the entire process of communicating information from a source (either a teacher or some materials) to a receiver (the learner).

In order to describe this entire process, the communications orientation added a second concept applicable to the current

definition—the use of dynamic models. While Dale's Cone of Experience was, in a sense, a model, it was still a static description of instructional techniques along a single dimension. The models created by communication theorists were dynamic models of a process—indicating the elements involved and the interrelationships among them—and included more than the materials used to transmit the message.

While many models of the communication process were developed (see Ball and Byrnes, 1960), the S-M-C-R Model (Berlo, 1960) is perhaps the simplest and the most useful for generating concepts related to educational technology. The model is shown in Figure 3.1.

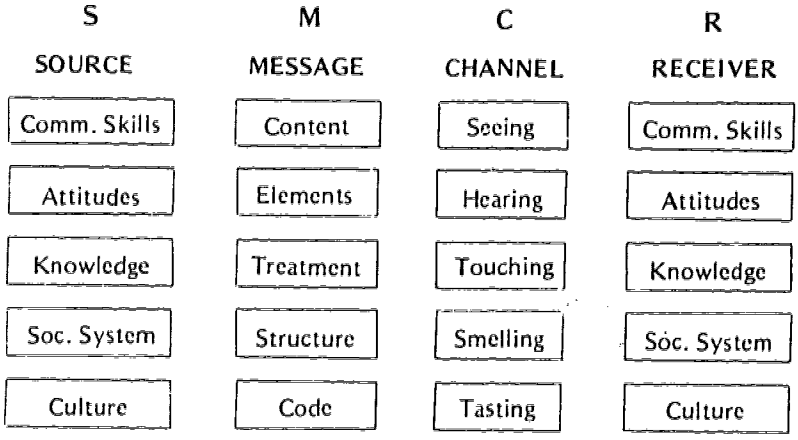



Figure 3.1
A MODEL OF THE INGREDIENTS IN COMMUNICATION*

This model demonstrates the two concepts indicated above. It concerns itself with the entire process of transmitting a message from a source to a receiver and it indicates the elements involved in the process and their dynamic interrelationships. In addition, the model's elements bring to light several other important concepts.

*From *The Process of Communication: An Introduction to Theory and Practice* by David K. Berlo. Copyright (c) 1960 by Holt, Rinehart and Winston, Inc. Reprinted by permission of Holt, Rinehart and Winston.

The learner (receiver) and the teacher or materials (source) are integral parts of educational technology seen as communications. They are not seen as being outside the concerns of the field.

The content of the message, as well as its structure and treatment, are seen as part of the communication process, and, hence, as part of educational technology.

Five senses are seen as part of the communication process, a concept more inclusive than the "eye-and-ear" experiences of the audiovisual movement.

All types of messages using all types of codes (verbal, symbolic, tactile as well as the concrete codes of the audiovisual movement) are seen as part of the communication process, and, hence, as part of educational technology.

Though the model appears linear in fashion, communication situations are seldom one-way. They occur in both directions. Other more complex models—notably the Wesley-MacLean (1957) and the Berlo Interpreter (1960) models—formalize this notion by adding to the model an element called feedback. Feedback is information sent back to the source by the receiver indicating his/her responses to the message.

In addition to these seven concepts, the communications orientation provided educational technology with a significant body of research (see Ball and Byrnes, 1960) related to the elements and their interrelationships in the communication process.

While the transition from audiovisual instruction to communications was occurring, a separate, but somewhat related, transition was occurring in parallel.

## FROM AUDIOVISUAL INSTRUCTION TO EARLY SYSTEMS CONCEPTS

> A system can be defined as an arrangement of components with a common purpose. The importance of the system concept is in the notion of (a) components in a system; (b) the integration of these components, and (c) the increase in system efficiency . . . . (Hoban, 1960, p. 110)

> The concept of programming and the systems and systems analysis it implies completely absorbs the ideas of materials. Instructional materials becomes an outmoded, atomistic, pre-technological concept useful mainly to the historians of education. (Finn, 1960b, p. 18)

The early systems concepts of educational technology regarded systems as products—not isolated products as in the audio-visual materials conception, but rather as complete products arranged and integrated in a manner which allowed them to provide complete instruction.

Most indicative of this product-oriented early system concept was the notion of combining mass and individual instruction with conventional instruction into an instructional system using a "black box" concept.

> If . . . the instructional process can be broken down into the elements of (a) mass presentation techniques; (b) individual automated teaching; (c) human interaction; (d) individual study; and (e) creative periods, then . . . these elements would be treated as black boxes in an instructional system. For each instructional problem . . . [we] would create the proper system designed to achieve the agreed upon objectives. (Finn, 1961, p. 37)

The Instructional Systems—Black Box Concept (Finn, 1961, p. 36) is shown in Figure 3.2.

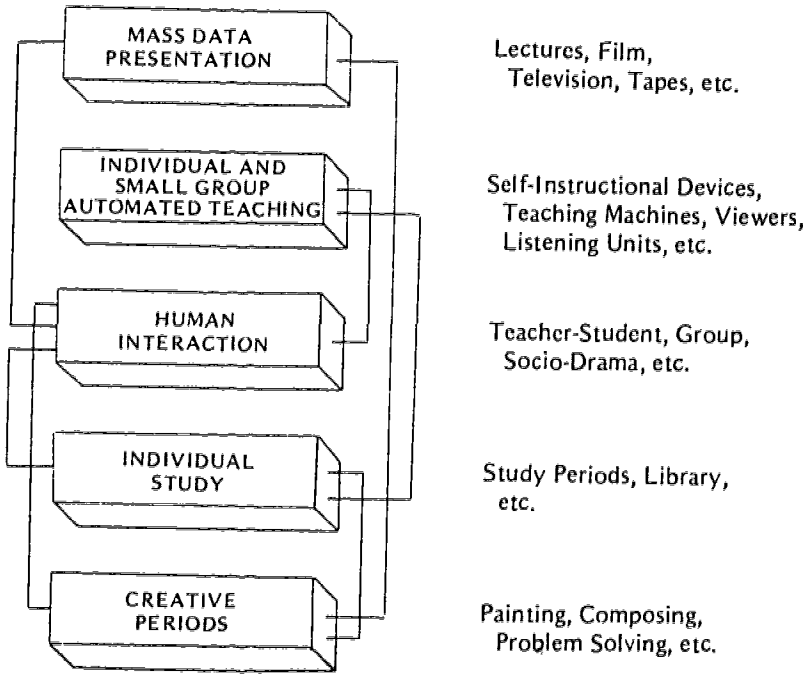



Figure 3.2
INSTRUCTIONAL SYSTEMS—BLACK BOX CONCEPT

This early systems concept of educational technology introduced several important new concepts to the field. First, it stressed that the basic unit, or product, of the field was not individual materials but rather complete instructional systems. A second, related concept was that individual materials were seen as components of an instructional system, not as isolated aids to the teacher's instruction.

Third, it indicated that instructional systems did not come into existence without cause. The integration of the components to make up a system had to be in some way designed. Further, it was not sufficient to say that materials should be somehow integrated into the curriculum. Systems concepts specified that the nature of that integration be based on instructional problems and objectives. Thus, in an instructional system, materials were to be designed as components for systematic use in a specified instructional situation.

These two new views of educational technology—communications and early systems concepts—were not separate for long.

## AUDIOVISUAL COMMUNICATIONS: SYNTHESIZING COMMUNICATIONS AND EARLY SYSTEMS CONCEPTS

> *Audiovisual communications is that branch of educational theory and practice concerned primarily with the design and use of messages which control the learning process.*
>
> It undertakes: (a) the study of the unique and relative strengths of both pictorial and non-representational messages which may be employed in the learning process for any purpose; and (b) the structuring and systematizing of messages by men and instruments in an educational environment. These undertakings include the planning, production, selection, management and utilization of both components and entire instructional systems.
>
> Its practical goal is the efficient utilization of every method and medium of communication which can contribute to the development of the learner's full potential. (Ely, 1963, 18-19)

This definition, the official definition of the field by DAVI in 1963, represented a major paradigm change (Kuhn, 1962) for educational technology—from an emphasis on audiovisual materials as aids providing concrete experience to an emphasis on the complete process of communication and the use of complete systems of instruction.

By completely altering the theoretical framework of the field, this definition and its supporting theory and models, provided new concepts for educational technology which are important to the current definition.

It replaced the "things, senses, concreteness" orientation of the field with a process concept. "The concept of process dictates the relationship between events as dynamic and continuous . . . . All elements in a process interact with each element, affecting all the others" (Ely, 1963, p. 19). In addition, this statement includes the seeds of systems-as-process concepts (to be discussed later).

It concluded that "learning theory and communication theory offer the basic concepts for a definition of the instructional technology field," (Ely, 1963, p. 20) and that "in view of a systems approach, the task of the audiovisual specialist may be described as . . . design of a presentation which utilizes . . . elements . . . . The appropriate combination of these elements implies a systems approach" (Ely, 1963, p. 24). Thus, the audiovisual communications synthesized the concepts of communications, systems, elements or components of a system, and design of a system (all discussed in the previous two sections) and the concept of learning theory (to be discussed later).

It developed a model which combined the process orientation of communication and learning theory with the system-as-product orientation. Ely (1963) termed this "AV relationships to the educational-communication process" (pp. 24-25).[1] The model is shown in Figure 3.3. The model synthesizes many concepts already discussed related to communications and systems, and adds some new concepts.

The model re-emphasizes that the learner is an integral part of the process of educational technology and brings in concepts from learning theory by adding to the communication model the elements of response by the learner and evaluation of that response. It also re-emphasizes, and formally indicates in the model, the communications concept of feedback—both to the

[1] It should be noted that the model, the elements in a system and their definitions, and the notions of systems used in the 1963 *Glossary* are based on the work done by Eboch, 1962.

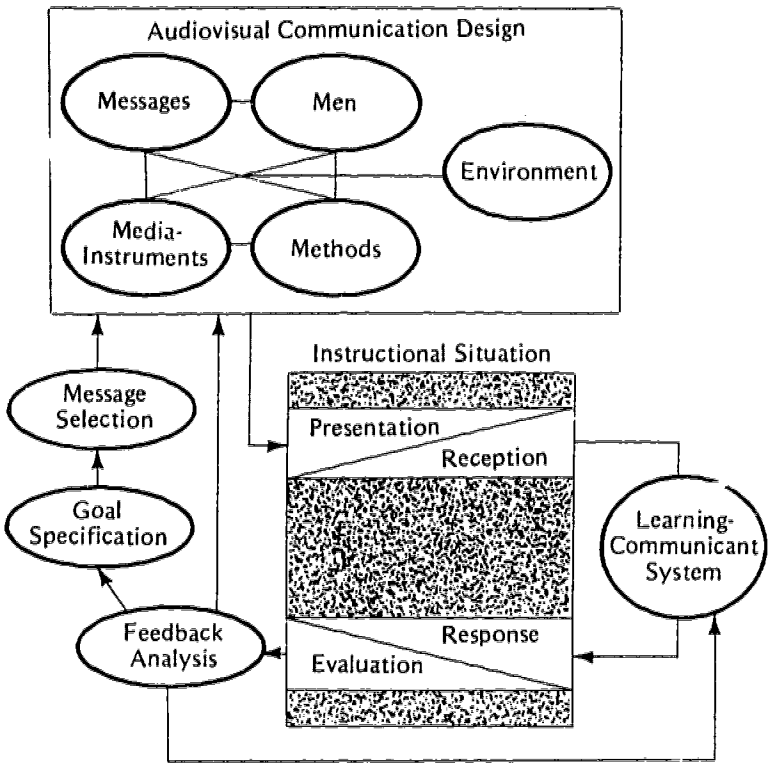



Figure 3.3
AV RELATIONSHIPS
TO EDUCATIONAL-COMMUNICATION PROCESS

source and the learner—regarding the learner's response. The model shows graphically both the two-way nature of communications, something merely implied in some communication models, as well as the dynamic, continuous, and interactive nature of the audiovisual communication process.

The model also went beyond stating that there were components of an instructional system. It identified and defined specific components:

*Messages* are the information to be transmitted—the content, the meaning.

*Media-Instrumentation* indicates the transmission systems

(the materials and devices) available for carrying the selected messages.

*Men* indicates the personnel required to control or assist in the information-transmission or the presentation.

*Methods* are the specifications and techniques required for effective presentations.

*Environment* indicates the controls or requirements of the given conditions within the instructional situation. (Ely, 1963, p. 24)

The model and its list of elements reemphasized several prior concepts, such as:

there are components within a system;

the components can be classified by type, rather than listing each individual component;

the message itself is an important component which must be included in the design of audiovisual communication, and;

people, as well as materials, must be included as components of the system.

The model also added two newer concepts:

the methods of utilizing "media-instruments" are important and must be considered as components of the system, and;

the environment in which the "media-instruments" are used affects the presentation and response, and therefore must also be considered as a component of the system.

The definition (though not the model) introduced the concept that certain activities must be performed in order to "design" systems. For the first time, the conceptual definition was related "to personnel who serve within the broad area of instructional technology" (Ely, 1963, p. 27). The definition statement called the activities performed, "Functions of Personnel Within the Field," thus introducing the notion of functions. (See also Morris, 1963.) The definition statement identified and explained several of the functions, such as: distribution, production, consultation, management, application of functions, and evaluation. Other functions, previously identified

(Hoban, 1956) but not included in the definition statement, were content organization and utilization.

While this definition, and its implications, represented a major paradigm change for educational technology and synthesized most of the concepts that had evolved from previous orientations, as well as introducing many new concepts to the field, it was not without its weaknesses.

The most noticeable weakness is its inconsistent use of names for the field. It used almost interchangeably the terms "audiovisual communications," "audiovisual," "educational communications," and "instructional technology." This created confusion about the actual name of the field—a confusion which persisted for many years (see the March, 1965 issue of *Audiovisual Instruction*).

The most important weakness, however, was on a more basic conceptual level. The definition contained the beginnings of the "systems-as-process" or "systems approach" concept. However, the definition did not appear to understand, use, or integrate the complete notion of the systems approach. This is evidenced by two problems in the definition. First, the model—offering the elements of a system and combining it with a communications model—and the functions of personnel in the field—necessary to implement the model—are seen and presented as separate concepts. They are never integrated to show how one relates to the other—an imperative in a true systems approach. Second, not all the elements of a systems approach are included as part of the "audiovisual communication design subsystem," *i.e.*, "*. . . Message selection occurs outside the context of the audiovisual design system*" as do goal specification and feedback analysis (Ely, 1963, p. 25). In a true systems approach, all elements would be included within the system. These weaknesses were to be corrected by the next theoretical framework for educational technology—a systems approach to education.

Before examining this change, however, it is necessary to consider another field which developed simultaneously with educational technology—a field which generated concepts applicable to educational technology at this point in its conceptual development. The field was behavioral sciences.

## INFLUENCE OF THE BEHAVIORAL SCIENCES

> From this prospect of an advancing science of learning, it is a shock to turn to that branch of technology which is most directly concerned with the learning process—education . . . . We are on the threshold of an exciting and revolutionary period, in which the scientific study of man will be put to work in man's best interest. Education must play its part. It must accept the fact that a sweeping revision of educational practices is possible and inevitable. (Skinner, 1954, reprinted in Skinner, 1968)

> . . . the science of behavior, especially learning theory, [serves] as a primary "underlying science" from which applications to a technology of instruction might be anticipated. (Lumsdaine, 1964, p. 373)

> Instructional technology is the application of behavioral technology to the systematic production of specified behaviors for instructional purposes. . . . (Deterline, 1965, p. 407)

The behavioral science input to instructional technology, while having its origins in early learning theories, began to have an impact on the field with Skinner's notions of reinforcement and their applications in programed instruction and teaching machines. The growth of concepts within the behavioral sciences is as long and complex as the growth of concepts within educational technology. It is not possible, therefore, to give a complete history of the behavioral sciences here. Rather, the focus will be upon several major conceptual contributions the behavioral sciences have made upon educational technology.

### Shift from stimuli to behavior and reinforcement

> So far as we are concerned here, teaching is simply the arrangement of contingencies of reinforcement . . . . Three variables compose the so-called contingencies of reinforcement under which learning takes place: (1) an occasion under which the behavior occurs, (2) the behavior itself, and (3) the consequences of the behavior. (Skinner, 1968, pp. 4, 5)

The theoretical framework of the audiovisual communications view of educational technology (of Figure 3.3) places heavy emphasis on the stimuli, or messages, transmitted to the learner. It makes only passing reference to the fact that there is a response from the learner and feedback to the learner about the response. Skinner's notion of behavioral science reverses this emphasis.

It adds the concept that the learner's behavior, and the consequences or reinforcement of that behavior, are the key elements in learning.

The emphasis on behavior and reinforcement, as opposed to stimuli, raises the question of how the behavior is to be elicited and reinforced.

### Use of Devices

> These requirements are not excessive, but they are probably incompatible with the current realities of the classroom . . . . We have every reason to expect, therefore, that the most effective control of human learning will require instrumental aid. The simple fact is that, as a mere reinforcing mechanism, the teacher is out of date. (Skinner, 1954, reprinted in Skinner, 1968, pp. 21-22)

Behavioral science, then, adds the concept that devices are required, but that their purpose changes from presentation to reinforcement. Also, the devices can, and must, take the place of the teacher for certain purposes.

The question then becomes one of the types and characteristics of devices needed for this new purpose.

### From presentation materials to teaching machines and programed instruction

> Audio-visual aids supplement and may even supplant lectures, demonstrations and textbooks. In doing so, they serve one function of the teacher: they present material to the student . . . . There is another function to which they contribute little or nothing (Skinner, 1968, pp. 29-30). . . . to generate specific forms of behavior these things must be related to the student's behavior in special ways. The principles on which his teaching machines were based are:
>
> 1) reinforce the student's responses frequently and immediately
> 2) provide for the student to be in control of his learning rate
> 3) make sure he follows a coherent, controlled sequence
> 4) require participation through responding. (Hawkridge, 1976, p. 15)

Skinner's teaching machines, and the ensuing programed instruction movement, were direct applications of the concept that devices and materials must do more than present information—they must be related to the student's behavior. The

specific relationships include: responding by the student, controlled sequence, frequent and immediate reinforcement, and individual learning rate. By doing these things, the devices and materials can manage the contingencies of reinforcement and thereby ensure learning.

### Behavioral objectives

> [Behavioral objectives] First, identify the terminal behavior by name . . . [and] specify the kind of behavior which we will accept as evidence that the learner has achieved the objective. Second, try to further define the desired behavior by describing the important conditions under which the behavior will be expected to occur. Third, specify the criteria of acceptable performance by describing how well the learner must perform to be considered acceptable. (Mager, 1962, p. 12)

The main concept provided by behavioral objectives was an emphasis on the learner's behavior and the conditions under which it would occur. This further extended the communications theory idea of the learner as a part of the process by detailing the learner's role.

Further, behavioral objectives should be stated before instruction was developed. This notion was widely accepted and applied to presentation materials and traditional teaching, as well as to Skinner's "contingency management" techniques. It also formed one of the bases for the later systems approaches (to be discussed later).

Finally, behavioral objectives provided the basis for a different type of evaluation of learning.

### Criterion-referenced evaluation

> Measures cast in terms of such criterion standards [*i.e.*, behaviorally defined objectives] provide information as to the degree of competency obtained by a particular student which is independent of reference to the performance of others. (Glaser, 1965, p. 801)

Criterion-referenced evaluation held that evaluation of learners ought to be based upon the degree to which they attained the behaviors specified in the objectives, rather than on how they compared to other students. It made clear the concept that

the evaluation (and therefore instruction) ought to be based on objectives, and not extraneous content. Finally, this implies that evaluation measures, like behavioral objectives, should be stated before the instruction is developed.

Behavioral objectives and criterion-referenced evaluation made better programed instruction possible. More important, they served to move programed instruction beyond small segments of instruction.

### Programing the school

> [Schools] have tended to adopt programed materials instead of the principles of programed instruction . . . programed instruction must be applied more inclusively to the development of the entire school curriculum, its materials, media, and personnel (217)
>
> . . . programing is a general process for developing an instructional sequence . . . (226) [and] will involve . . . the development and adoption of some total plan that employs some sound learning principles and is subjected to careful and continuous study and analysis. It will involve the development of a technology of instruction (226)
>
> . . . It will be necessary to "program" the *entire* school curriculum (230). (Lindvall and Bolvin, 1967, pp. 217-254)

The thought that the entire instructional program of a school—as opposed to isolated instances of instruction—should be "programed" to meet Skinner's principles represented a quantum leap forward for the programed instruction, and hence behavioral technology, movement.

It introduced (or, at least, updated) the concept of individualized and self-instruction for entire courses, based on behavioral objectives, using programed materials, and with criterion-referenced evaluation

This was coupled with the concept that the management of the instructional process must be congruent with the characteristics of that process; that is, that self-paced, individualized, and machine-based instruction were not appropriate within a school organized and managed for group-paced, group-based, teacher based instruction. It raised a significant question. How were the individualized materials, which formed the backbone of the new process, to be developed?

### Programing as a developmental process

> The uniqueness and strength of programed instruction lies mainly in its production process. Unfortunately, this process is not evident in programed materials or environments, although the process has determined their structure and quality. Programed instruction is developed through a process which has empirical and analytic qualities. (Lange, 1967, p. 57)

Another insight into the behavioral technology theoretical framework was this realization that, while programed instructional materials must contain certain elements to "manage the contingencies of reinforcement," the programed materials themselves were not the totality of programed instruction.

There was also a significant developmental process in producing programed materials to make them effective instructional tools. The process synthesized many of the concepts previously discussed into a series of steps which provide a model for the development of programed instruction. The model is shown in Figure 3.4.

This sequence reemphasizes behavioral objectives, criterion-referenced evaluation, and behavioral analysis and also adds the concept of testing the program before it is released for general use. The program is then revised based on the test results.

This approach to programed instruction provides a model for developing instruction—a model quickly assimilated into educational technology.

## FROM AUDIOVISUAL COMMUNICATIONS TO THE SYSTEMS APPROACH AND INSTRUCTIONAL DEVELOPMENT

> More recent thinking conceives of educational technology as a systems approach to the teaching learning process which centers around the optimal design, implementation, and evaluation of teaching and learning as such. (Hinst, 1971, p. 41)

> The second and less familiar definition of instructional technology goes beyond any particular medium or device. In this sense, instructional technology is more than the sum of its parts. It is a systematic way of designing, carrying out, and evaluating the total

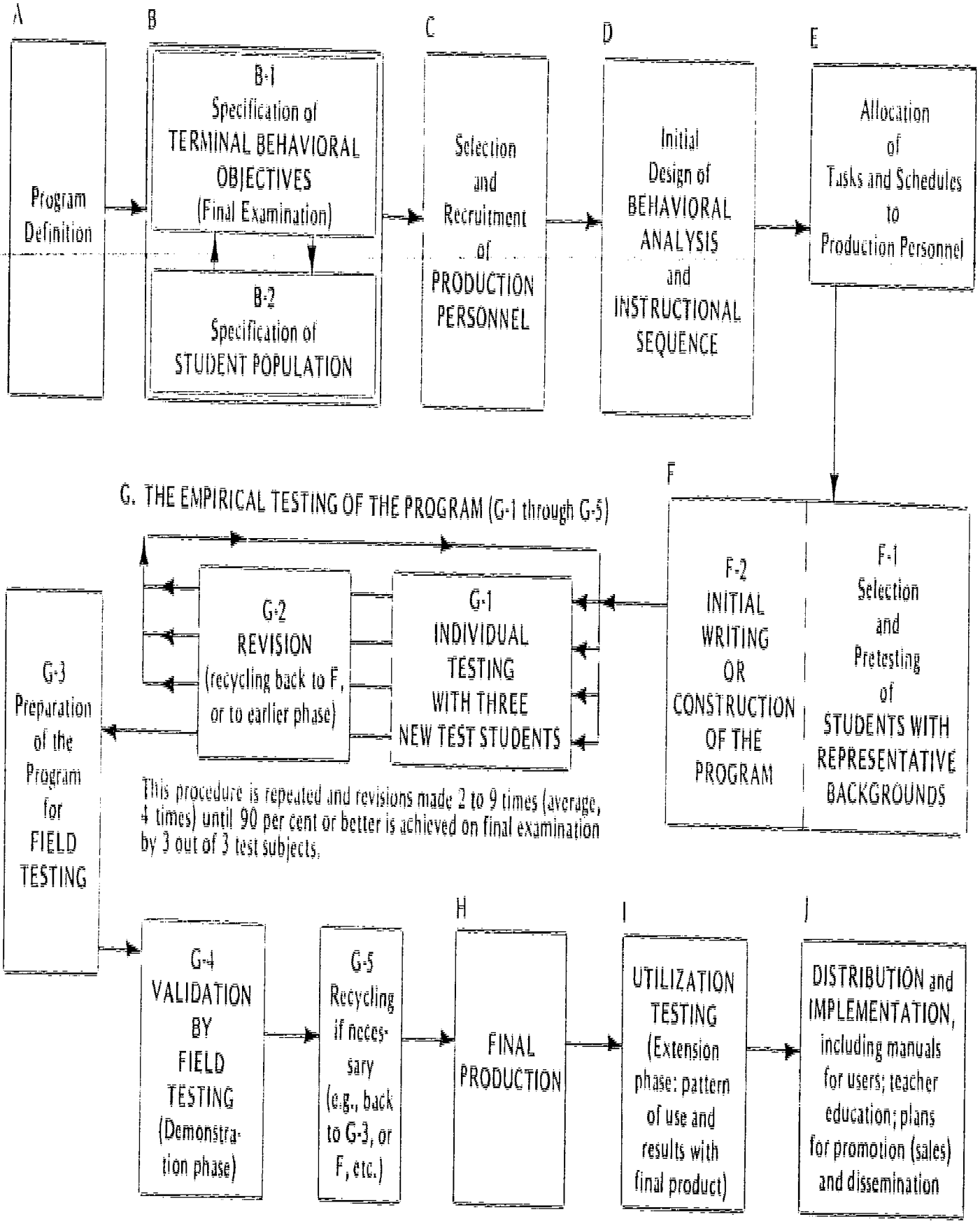



Figure 3.4 A GENERALIZED FLOW CHART OF PROGRAM DEVELOPMENT

> process of learning and teaching in terms of specific objectives based on human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction. (Commission on Instructional Technology, 1970, p. 21)

While the report of the President's Commission has been widely criticized (see Snider, 1971), it contained many concepts relevant to the present definition.

It posits educational technology as process, rather than as media or devices—thus reinforcing the concepts from communications theory and programed instruction.

It specifies that educational technology uses a systems approach to instruction, stressing process rather than product—a departure from earlier systems thinking. The systems approach now required the

> . . . examination of a process as an entity with cognizance of the relationships involved in and among all components. It starts with specification of objectives, proceeds through the necessary operations, and evaluates the end product in terms of these objectives and modifies the system if found wanting. (Heinich, 1965, p. 4)

It is essentially the same as the process used for developing programed instruction.

It indicated that educational technology is based on both learning and communication theory, thus supporting the position of the 1963 DAVI definition statement and incorporating the principles derived from the behavioral sciences.

It saw educational technology as making use of both human and nonhuman resources—re-emphasizing that people are part of educational technology.

It viewed the products of educational technology as resources that could be used to improve instruction. This is the first official use of the term "resources" to describe the products of educational technology.

In using the terms "designing," "carrying out," and "evaluating," it again stressed the notion that there were certain functions which had to be carried out by personnel within the field of educational technology.

It introduced the concept that educational technology is "more than the sum of its parts"—that by combining all the functions and resources in the systematic process, something new and different was created that went beyond what could be expected from any of these elements applied separately. This phenomenon is referred to as "synergism."

The systems approach to designing instruction was carried a step further by the instructional development movement, which synthesized these concepts with those from the behavioral sciences to create a formalized approach to how instruction is technology developed within educational technology.

There are few complete formal definitions of instructional development. The following synthesis (AECT, 1977) gives the flavor of its theoretical framework:

> A systematic approach to the design, production, evaluation, and utilization of complete systems of instruction, including all appropriate components and a management pattern for using them; instructional development is larger than instructional product development, which is concerned with only isolated products, and is larger than instructional design, which is only one part of instructional development. (D & T Committee)

The systematic process of developing instruction is usually presented in the form of a model. Though there is no single universally accepted model, the model in Figure 3.5 (according to Wittich and Schuller, 1973) contains the elements and sequence within which most other models can fit.

The theoretical framework of instructional development serves to synthesize and formalize many of the concepts already discussed: process, systems approach, functions. It is also helpful in expanding and indicating some relationships among: behavioral objectives, criterion-referenced tests, use of appropriate human and nonhuman resources, appropriate use of individualized and self-instruction, development of complete instructional systems, emphasis on the learner, evaluation and revision of the instructional system and products based on tryouts with learners, and systematic management—all key elements in applying technology to instruction.

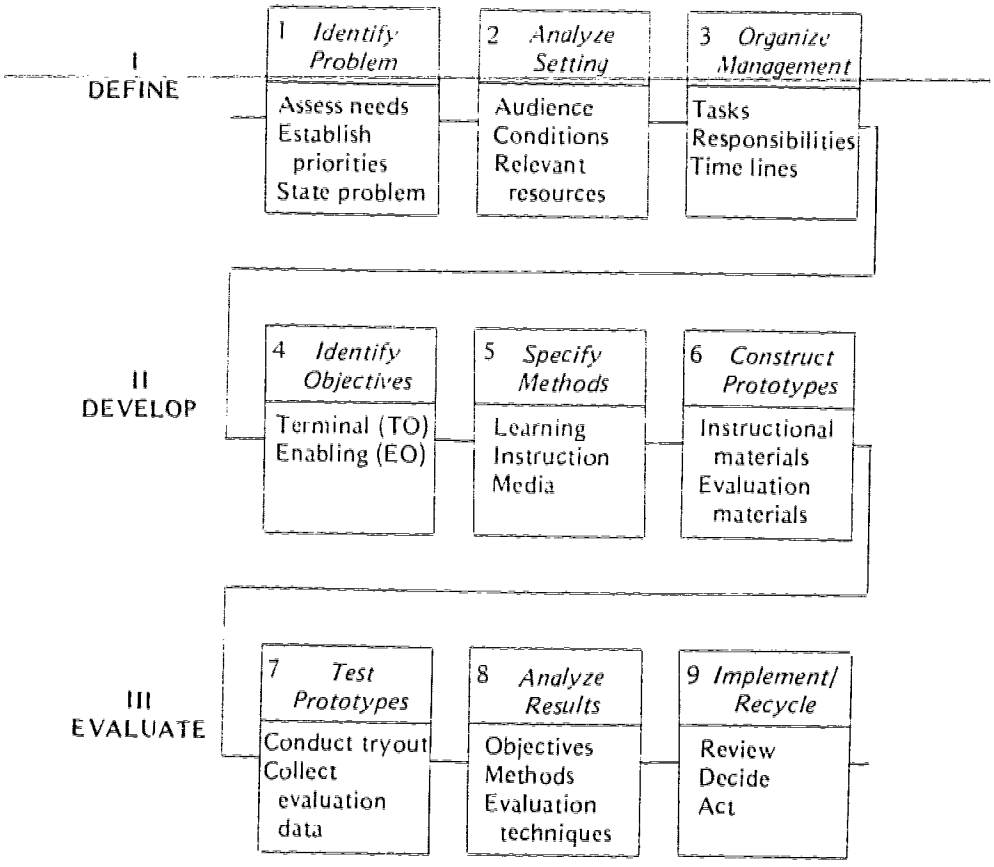



Figure 3.5
INSTRUCTIONAL DEVELOPMENT SYSTEM

The Instructional Development Model shown here was developed between 1969-71 by the University Consortium for Instructional Development and Technology (UCIDT) under a contract with the USOE as part of the Instructional Development Institute (IDI) program. IDIs have been given in over 350 U.S. school systems and in Iran and in the Philippines. UCIDT consists of Instructional Development and Technology Departments in the following universities: Indiana, Michigan State, Syracuse, U.S. International University in San Diego, and Southern California where the National Office is located.

However, the systems approach theoretical framework of the President's Commission and instructional development still does not provide an adequate definition of educational technology. First, it does not deal with the total educational—or even instructional—process. For example, it omits the determination of curriculum, the functions involved in distributing and using instructional systems once they are developed, and the activities involved in applying technology to the non-instructional parts of education.

Second, it accepts current institutional and organizational constraints placed upon the design of instruction (the problem noted earlier by Lindvall and Bolvin), rather than questioning and revising them to fit the new instructional systems.

Third, it is less specific than the 1963 DAVI definition about the types of resources which could be used as well as the direct interaction (communication) between the learner and the source of the messages (resources).

Fourth, while it is indeed based on a body of theory and research, there is no provision within the definition or the model for generating or testing new theory.

Finally, it is not connected to the realities—both problems and promises—of Galbraith's (1967) "post-industrial society."

## FROM AUDIOVISUAL COMMUNICATIONS AND SYSTEMS APPROACHES TO INSTRUCTIONAL TECHNOLOGY

> Technology is *not* just machines and men. It is a complex integrated organization of men and machines, of ideas, of procedures, and of management . . . the term "educational technology" *expands* the areas of theoretical development, research and implementation in education. (Hoban, 1965, p. 124)

. . . instructional technology, in its modern usage, involves the *management* of ideas, procedures, money, machines, and people in the instructional process. As such, it involves:

(1) a physical device(s) which mediates information transmission;
(2) a system of instruction of which this device(s) is one of several components; and
(3) a range of mediating options involving progression in (a) requirements for physical alteration of the "classroom"; (b) remoteness in time and space between the tutor-planner and the student;

> (c) sophistication of design of programmed information exchange between the "tutor" and the student; (d) complexity and cost of hardware; (e) level of technical skills required for equipment construction, installation, "de-bugging," operation and maintenance; (f) independence from classroom teacher control or continuous monitoring in the operation of the device-centered teaching; (g) additional manpower required by way of paraprofessional personnel for the use of instructional technology, and (h) role changes and new skills required of "classroom" teachers in (I) management of technology, and (II) other and/or new non-structured, non-mediated teaching activities essential to personality development, humanistic growth, and cultivation of values, all of which lie outside the present and forseeable potential of instructional technology as herein considered. (Hoban, 1965, p. 124)

The theoretical framework of instructional technology represents the second major paradigm change (Kuhn, 1962) for educational technology. It brings a whole new outlook to how educational technology fits together and is related to society.

The needs for, and causes of, this paradigm change in viewing the field and its relation to society were identified by Finn (1955, 1960b, 1964b, 1966, 1968):

the knowledge explosion,

the population explosion,

the second industrial revolution,

the long revolution (including democratic, industrial-scientific, and cultural revolutions),

the need to re-make the public philosophy to fit the times,

the introduction of technology on a large scale in society in general,

the need to ensure an adequate supply of scientists to operate the technological society,

the need for general education of all citizens about technology,

the need to rapidly retrain people displaced by automation,

the inevitable extension of technology in general society into the instructional process.

The growth of instructional technology to the point where it could serve as a theoretical framework for the field is shown in Figure 3.6.

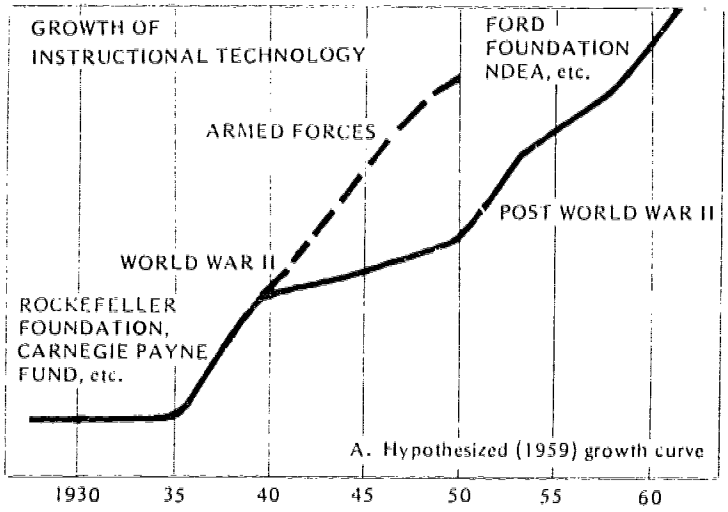



Figure 3.6
GROWTH OF INSTRUCTIONAL TECHNOLOGY
(Finn, 1961)

This growth follows Rostow's (1960) 5 stages of the growth from a traditional society to a high-order technological culture:

1. *traditional society*—science and technology are not available or regularly and systematically applied;

2. *preconditions to take-off*—there are psychological and political changes in society which make people and institutions receptive to technology, and there is the building of a necessary level of capital overhead in society;

3. *take-off*—the critical mass of the preconditions is reached, and some technological innovation occurs acts as a sharp stimulus to technological thinking;

4. *drive to maturity*—there are more refined and complex technological processes used, and society's investment in tools is 10-20%;

5. *high mass consumption*—society applies technological processes and resources anywhere it chooses.

Finn (1960c) believed that machines, which he viewed as the symbols of technology, and the societal changes cited above represented the "preconditions to take-off" stage for instructional technology, and that "the educational culture is in take-off." (p. 70)

The framework for instructional technology introduces the concept of complex, integrated organization—more than only process, or only people, or only machines, and even more than a simple combination of these. The components making up technology bear complex interactive relationships.

It also identifies those elements within that complex, integrated organization—*i.e.*, people, procedures, ideas, machines—at the same time emphasizing that each is but a single element.

Second, and perhaps most important, it emphasizes the role of management as a major concern of educational technology. *All* of the aforementioned elements must be managed and controlled so the system operates both effectively and efficiently.

The notion of efficiency highlights the third concept contributed by this theoretical framework, finances. Educational technology is concerned with expending money in a way that maximizes the effectiveness of the people, processes, and devices.

Fourth, it refines the concept of "people" as part of the process in two ways. It adds the notion of specialization and differentiation between the levels of work of personnel from aides to professionals. It specifies that personnel will need new skills to operate within the context of educational technology.

Fifth, it expands on Finn's (1961) "black-box concept" by making clear that there can be a remoteness in time and space between the learner and the source of the message and that there are clearly instances where mediated instruction (not involving a classroom teacher) is appropriate, if not preferred or mandated.

This theoretical construct of educational technology does have one particular flaw. It does not explain in detail the nature of the "complex, integrated organization" for these components nor precisely how they fit together.

## REFINING EDUCATIONAL TECHNOLOGY

> Educational technology is a field involved in the facilitation of human learning through the systematic identification, development, organization, and utilization of a full range of learning resources, and through the management of these processes . . . . Educational technology can be described by first the materials it uses and then by describing what its practitioners do with them. Specifically, this means describing: 1) the range of resources for learning with which the field deals; 2) the systematic way it identifies, develops, organizes, makes available, and utilizes these resources, *and* the way it manages that process . . . . The description of the field of educational technology is summarized in . . . [the Domain of Educational Technology Model]. (AECT, 1972, pp. 36, 38, 40)

This definition is one of several attempts to describe the complex, integrated process that synthesizes all the concepts. In addition to a verbal description, the definition used a model to describe educational technology. Other efforts attempted this synthesis through studies, definitions, articles, and books, all using this model approach. These efforts are cited in Table 3.1.

While all these efforts were steps in the right direction, there was still a problem. Each used a slightly different "complex, integrated organization" in the model they proposed, and there was some disagreement in the field about which one was the best (see Myers and Cochran, 1972).

## TO THE PRESENT DEFINITION

> Somehow, somebody, someday is going to figure out how to put these things together into a fairly useful order of instruction to solve specific problems . . . . Now if this is true, I'll leave you with this question. Who is going to do it? (Finn, 1960c, p. 61)

The definition presented in this document represents what AECT believes is the best refinement and synthesis of educational technology, at this point in time. It draws heavily on all the theoretical frameworks presented in this chapter, and especially on the models which attempted to refine educational technology. While drawing heavily on these past efforts, taking the best elements of each, it does not merely endorse one of these efforts. Rather, it attempts to synthesize them into a

definition and model of educational technology which shows all the elements and concepts of educational technology and their interrelationships in a complete, cohesive, clear, and coherent manner.

Table 3.1
Efforts to Refine Educational Technology

| Purpose | Effort | Author(s) | Date |
|---|---|---|---|
| Defining the Field | "What Field Are We In, Anyhow," *Audiovisual Instruction* | Silber | 1970 |
| | "The Field of Educational Technology: A Statement of Definition," *Audiovisual Instruction* | AECT | 1972 |
| | "Is There a Field of Educational Communications and Technology," *Audiovisual Instruction* | Heinich | 1973 |
| | *Technology and the Management of Instruction* | Heinich | 1970 |
| Career Development and Training | *Jobs in Instructional Media (Part I)* | Wallington, *et. al.* | 1970 |
| | *Jobs in Instructional Media Study* | Hyer, *et al.* | 1971 |
| | *Media Guidelines Study* | Hamreus | 1970 |
| | *Training Programs for Educational Media Technicians* | Wallington and Bruce | 1972 |
| | *Media Personnel in Education* | Chisolm and Ely | 1976 |
| Collecting Data | *NCES Handbook X: Educational Technology* | AECT for NCES | 1975 |

# CHAPTER IV

# Expanding Theory– The Current Theoretical Framework

## UNDERLYING ASSUMPTIONS AND CONCEPTS

Any conceptual definition is built upon a set of subordinate concepts and has implicit in it a set of underlying assumptions. The definition of educational technology is no exception.

The assumptions upon which the definition of educational technology is based are:

> Modern society is characterized by a high degree of technological sophistication . . . .
>
> A technological culture, by definition, is one that finds technological solutions to its problems . . .
>
> A new technology for instruction has been developed and proved through basic research and practice . . .
>
> The new educational technology is capable of meeting and solving certain of the school's major problems in instruction, organization, and administration.
>
> Application of the new technology will result in major changes affecting the administration, organization and physical facilities of the public schools.
>
> Methods of instruction will be modified to a major degree, particularly in the presentation of information [and management of contingencies of reinforcement].

> Teachers and learners will have changed roles and new activities as a result of this technological change.
>
> A new kind of professional will be required to provide leadership in design, implementation and evaluation of programs of education which make the fullest use of [educational technology] . . . (Morris, 1963, pp. 10, 11)

The definition of educational technology is made up of, and uses, many concepts—each of which must be defined and understood if the full definition is to have any meaning.

*Education and Instruction.* To many, the terms education and instruction are synonomous. This equation of the two terms is erroneous, and leads to confusion in defining educational technology.

Education is a broad, total concept:

> . . . the aggregate of all the processes by means of which a person develops abilities, attitudes, and other forms of behavior of positive value in the society in which he lives. (Good, 1973, p. 202)

Instruction, on the other hand, is a specific subset of education:

> . . . the process whereby the environment of an individual is deliberately managed to enable him to learn to emit or engage in specified behaviors under specified conditions or as responses to specified situations. (Corey, 1967, p. 6)

Education, then, includes two classes of processes not included in instruction: those processes related to the administration of instruction (*e.g.*, personnel, scheduling, food and transportation, finances) and those processes related to situations in which learning occurs when it is not deliberately managed (*e.g.*, outside of school, incidental learning, using noninstructional resources—television, museums). Instruction is a subset within the total process of education.

Does the concept technology have any unique impact on the processes of education and instruction?

*Technology.* To some, technology denotes only machinery—and in the case of educational technology, the machinery used in education. The President's Commission took this view when it defined instructional technology as "the media born of the

communications revolution" and looked at the "pieces [machines] that make up instructional technology" (1970, p. 21).

This view of technology is incomplete. As mentioned earlier, machines "are the *symbols* of instructional technology" (Finn, 1961, p. 32). Technology is a much larger concept.

> Technology means the systematic application of scientific or other organized knowledge to practical tasks. (Galbraith, 1967, p. 24)

> Technology is *not* just machines and men. It is a complex integrated organization of men and machines, of ideas, of procedures, and of management . . . . the term "educational technology" *expands* the areas of theoretical development, research and implementation in education. (Hoban, 1965, p. 124)

> Technology includes processes, systems, management and control mechanisms, both human and non-human, and above all . . . a way of looking at problems as to their interest, and difficulty, the feasibility of technical solutions, and the economic values -broadly considered--of those solutions. (Finn, in Eboch, 1963, p. 17)

*Applied to education, technology is a complex, integrated process for analyzing problems, and of devising, implementing, managing and controlling and evaluating solutions to those problems.*

*Tasks.* The application of technology to education and instruction have many important consequences for these processes. "Its most important consequence . . . is in forcing the division and sub-division of any such task into its component parts." (Galbraith, 1967, p. 31) The result of applying technology, then, is a division of the processes of education and instruction into their component tasks. A task is:

> . . . one of the distinct activities that constitute logical and necessary steps in the performance of work by the worker (U.S. Department of Labor, 1972, p. 3).

More specifically, *a task*, (as derived from Hyer, *et al.*, 1971, p. 46) is an activity which is an observable and/or measurable unit of work done by a person or machine which has a direct or immediate outcome, and which, with other tasks, contributes directly to the accomplishment of a goal or purpose.

An example of a task, according to these definitions, is "Operates camera (activity) to take slides (outcome) to produce slide presentation (purpose)."

The division of the processes of educational and instructional technology results in the identification of thousands of tasks. Task management becomes a central issue.

*Functions.* Tasks are more easily managed if grouped according to some type of similarities. Functions represent such a grouping of tasks. Grouping by functions differs from grouping by job or job title and gives more accurate groupings.

> . . . In the field of instructional technology, these . . . have taken the form of Building Coordinator, Librarian, IMC Director, Film Producer, Graphic Technician, Professor, and the like. These jobs . . . are *not very useful in describing either what the individual actually does on the job or how one job differs from another job.* Therefore, neither a listing of, nor a classification of, jobs . . . provides the organization needed (Wallington *et al.*, 1970, p. 295; italics added).

The concept of functions remedies these problems. Functions are not new to educational technology (see Ely, 1963; Morris, 1963; Eboch, 1963). A function is defined as:

> . . . a unique cluster of tasks which have a common and unique set of *activities, outcomes,* or *purposes* . . . . (Hyer, *et al.*, 1971, p. 47)

A function is not the same as a job. "Function" has several advantages over "job" as an organizer of tasks in educational technology. Grouping tasks by function:

considers the activity, outcome and purpose of the task in grouping;

is based on what gets done rather than on who performs the task, where, or on what job;

sets up mutually exclusive groupings by using unique sets of activities, outcomes, and purposes;

is based on a theoretical rationale—the definition of educational technology—rather than on haphazard practice.

Therefore, educational and instructional technology will be defined in terms of functions, based on tasks found in the application of technology to the processes of education and instruction.

## CONCEPTUAL DEFINITION OF EDUCATIONAL TECHNOLOGY

*Educational technology* is a complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems, and devising, implementing, evaluating and managing solutions to those problems, involved in all aspects of human learning. In educational technology, the solutions to problems take the form of all the *Learning Resources* that are designed and/or selected and/or utilized to bring about learning; these resources are identified as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems, and devising, implementing and evaluating solutions are identified by the *Educational Development Functions* of Research-Theory, Design, Production, Evaluation-Selection, Logistics, and Utilization. The processes of directing or coordinating one or more of these functions are identified by the *Educational Management Functions* of Organization Management and Personnel Management. The relationships among these elements are shown by the Domain of Educational Technology Model:

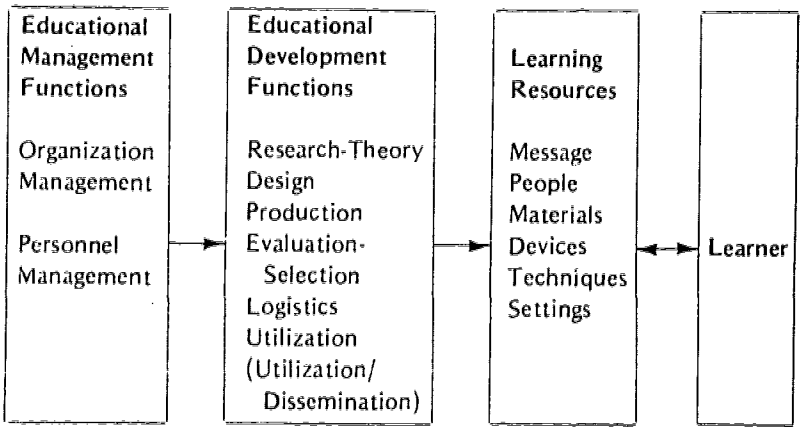



Figure 4.1
DOMAIN OF EDUCATIONAL TECHNOLOGY

The elements of the DET Model are defined in Tables 4.1, 4.2, and 4.3.

## Table 4.1
## Learning Resources/Instructional System Components

*Learning Resources* (for Educational Technology)—all of the resources (data, people, and things) which may be used by the learner in isolation or in combination, usually in an informal manner, to facilitate learning; they include Messages, People, Materials, Devices, Techniques, and Settings. There are two types: (a) resources by design—those resources which have been specifically developed as "instructional system components" in order to facilitate purposive, formal learning, and (b) resources by utilization—those resources which have not specifically been designed for instruction but which can be discovered, applied, and used for learning purposes.

*Instructional System Components (ISC)* (for Instructional Technology)—those learning resources which are prestructured in design or selection *and* utilization, and combined into complete instructional systems, to bring about purposive and controlled learning.

| Resource or Component | Definition | Examples |
|---|---|---|
| Message | Information to be transmitted by the other components; takes the form of ideas, facts, meanings, data. | Any subject matter/content, *e.g.*, the history of the Greeks; Ohm's Law; World Series results; the parliamentary system of government; conjugation of the verb "to be." |
| People | Persons who are acting to store and/or transmit Messages. | Teacher; student; actor; speaker. |

**Learning Resources/Instructional System Components**

| Resource or Component | Definition | Examples |
|---|---|---|
| Material | Items (traditionally called media or software) which usually store Messages for transmission by devices; sometimes self-displaying. | Overhead transparency; slide; filmstrip; 16mm motion picture; 8mm motion picture; videotape; record; audiotape; programed instruction materials; computer-assisted instruction program; book; journal. |
| Device | Items (traditionally called hardware) which transmit Messages stored on Materials. | Overhead projector; slide projector; filmstrip projector; 16mm film projector; 8mm film projector; videotape recorder; television set; record player; radio; tape recorder; dial access information retrieval system console; teaching machine; talking typewriter; computer output devices. |
| Technique | Routine procedures or precast molds for using Materials, Devices, Settings, and People to transmit Messages. | Computer-assisted instruction; programed instruction; simulation; gaming; discovery; inquiry; field trip; team teaching; individualized instruction; self-instruction; group instruction; lecture; discussion. |
| Setting | The environment in which the Messages are received. | *Physical:* school building; instructional materials center; library; studio; classroom; auditorium. *Environmental:* lighting; heating; acoustics. |

Table 4.2
Educational/Instructional Development Functions

Functions which have as their purpose analyzing problems, and devising, implementing, and evaluating the Learning Resources/ Instructional System Components solutions to these problems.

| Function | Definition | Examples |
|---|---|---|
| *Research-Theory* Purpose: | To generate and test knowledge (theory and research methodology) related to the functions, Learning Resources and Instructional System Components and learners. | To conceptualize theoretical models.<br>To conduct research projects.<br>To analyze research data. |
| Outcome: | Knowledge which can act as an input to the other functions. | To generate new ideas.<br>To test validity of model.<br>To test hypotheses. |
| Activity: | Seeking information, reading it, analyzing it, synthesizing it, testing it, analyzing test results. | Reads proposal.<br>Compares model with known data.<br>Formulates specific hypotheses. |
| *Design* Purpose: | To translate general theoretical knowledge into specifications for Learning Resources or Instructional System Components. | To design programed instruction materials.<br>To develop instructional modules for individualized instruction.<br>To design equipment systems. |

Educational/Instructional Development Functions

| Function | Definition | Examples |
|---|---|---|
| Outcome: | Specifications for production of Learning Resources and Instructional System Components, regardless of format or resource. | To write general objectives.<br>To determine medium.<br>To describe technical systems. |
| Activity: | Analyzing, synthesizing, and writing objectives, learner characteristics, task analyses, learning conditions, instructional events, specifications for Learning Resources and Instructional Systems Components. | Analyzes objectives.<br>Synthesizes objectives/sequence/content/media.<br>Arranges materials in sequence. |
| *Production*<br>Purpose: | To translate specifications for Learning Resources or Instructional Systems Components into specific actual items. | To produce audiotapes.<br>To direct motion picture.<br>To write computer programs for computer-assisted instruction. |
| Outcome: | Specific products in the form of test versions, prototypes, or mass-produced versions. | To make slides into test filmstrips.<br>To decide on music/sound effects.<br>To match audio and visuals. |
| Activity: | Operating production equipment, drawing, laying out, writing, building products. | Mixes narration tape and sound.<br>Sequences slides using viewer.<br>Operates motion picture camera. |

**Educational/Instructional Development Functions**

| Function | Definition | Examples |
|---|---|---|
| *Evaluation-Selection* Purpose: | To assess acceptability of actual produced Learning Resources or Instructional System Components in terms of criteria set by other functions, and to develop models for this assessment. | To pilot test prototype instructional materials.<br>To preview and select instructional materials.<br>To develop evaluation models and techniques. |
| Outcomes: | (a) Evaluation for Design: effectiveness of Learning Resources or Instructional System Components in meeting their objectives.<br>(b) Evaluation for Production: acceptability of items in meeting production standards.<br>(c) Evaluation for Evaluation: evaluation models.<br>(d) Evaluation for Selection: acceptability of items for acquisition for a specific purpose.<br>(e) Evaluation for Utilization: acceptability of items for meeting learning objectives in actual use. | To identify problems with materials.<br>To identify objectives not met.<br>To insure acceptable sound quality. |
| Activity: | Analyzing quality in terms of standards. | Observes students using materials.<br>Analyzes possible uses of materials.<br>Compares data and objectives. |

**Educational/Instructional Development Functions**

| Function | Definition | Examples |
|---|---|---|
| *Logistics* Purpose: | To make Learning Resources and Instructional System Components available for other functions. | To have equipment ready as needed.<br>To provide delivery service.<br>To catalog materials. |
| Outcome: | Ordered, stored, retrieved, classified, catalogued, assembled, scheduled, distributed, operated, maintained, and repaired Learning Resources and Instructional System Components. | To cross-index materials.<br>To locate materials for delivery.<br>To keep repair history.<br>To repair filmstrip projector. |
| Activity: | Ordering, storing, retrieving, classifying, cataloging, assembling, scheduling, distributing, operating, maintaining, repairing Learning Resources and Instructional System Components. | Threads movie projector.<br>Assigns media code from list.<br>Plans new scheduling system. |
| *Utilization* Purpose: | To bring learners into contact with Learning Resources and Instructional System Components. | To help student use learning activity.<br>To monitor individualized and self-instruction.<br>To help student select learning activities and to meet objectives. |
| Outcome: | Facilitation and assessment of student learning. | To analyze student learning style.<br>To present information.<br>To encourage interest in learning activity. |

**Educational/Instructional Development Functions**

| Function | Definition | Examples |
|---|---|---|
| Activity: | Assigning, preparing learner for, presenting, assisting, and following up Learning Resources and Instructional System Components; testing learners. | Discusses with student. Compares learning activities with learning style. Compares pre- and post-tests. |
| *Utilization-Dissemination* Purpose: | (A special subfunction of Utilization.) To bring learners into contact with information about educational technology. | To consult on materials design and use. To teach photography course. To explain individualized instruction project. To increase use of learning resources center services by teachers. |
| Outcome: | Dissemination of information about educational technology. | To provide models for designing instruction. To improve use of mediated instruction by teachers. To answer questions about individualized instruction project. To demonstrate projector. To explain learning resources center services to teachers. |
| Activity: | Taking in and giving out information about educational technology. | Defines learning resources center services available. Writes professional articles. Views microteaching lesson. Role plays teacher using mediated instruction. |

## Table 4.3
## Educational/Instructional Management Functions

Functions which have as their purpose the directing or controlling of one or more of the Educational/Instructional Development Functions or of other Educational/Instructional Management Functions to ensure their effective operation.

| Function | Definition | Examples |
|---|---|---|
| *Organization/Management* | | |
| Purpose: | To determine, modify, or execute the objectives, philosophy, policy, structure, budget, internal and external relationships, and administrative procedures of an organization performing one or several of the Development functions or the Management functions. | To administer/direct project which includes two or more functions.<br>To monitor and change operation of center.<br>To provide secretarial services in an audio-visual center. |
| Outcome: | Policy, budget, plans, coordinated activities, administrative operations. | To prepare budget.<br>To identify organization needs.<br>To ascertain jobs to be done. |
| Activity: | Defining, writing, and carrying out procedures leading to the outcomes. | Reviews purchase orders.<br>Designs new organizational model.<br>Analyzes problems in project. |

Educational/Instructional Management Functions

| Function | Definition | Examples |
|---|---|---|
| *Personnel-Management*<br>Purpose: | To interact with and/or to supervise the people who perform activities in the functions. | To supervise personnel in graphics unit.<br>To improve communications between technicians and artists.<br>To staff projects |
| Outcome: | Interpersonal interaction, discussion, supervision, employment, and personal development. | To evaluate work performed.<br>To encourage discussion.<br>To supervise the repairperson. |
| Activity: | Discussing with and speaking to other people. | Negotiates with personnel department.<br>Questions applicants.<br>Talks with new employees. |

## RATIONALE FOR THE DEFINITION.

The ascending evolution of any field is marked by major changes in paradigms of that field. This definition represents the third major paradigm change in the field of educational technology. The other major paradigm changes are chronicled in Chapter III.

Although Kuhn would have us believe that new paradigms represent a complete break with previous paradigms, they are probably more Hegelian in nature--looking at problems in a new way, yet building in some way what has gone before.

This new paradigm for the field of educational technology presents a new approach to solving educational problems. The new approach is, however, a logical extension and expansion of the field and as such includes concepts identified in earlier "educational technology" paradigms. This critical concept and the relationship of the present paradigm to previous paradigms are covered later.

The use of a model to describe the new paradigm helps clarify and illustrate both the new approach to educational technology, and, at the same time, how this new approach builds on what has come before.

### Rationale for Models and Modeling.

A model is a "conceptualization in the form of an equation, a physical device, a narrative, or a graphic analogue representing a real-life situation . . . either as it is or as it should be." (Silvern, 1965, p. 27) The model, while not the real situation, is a "replica of the original. The more faithful the replica, the better it is as a model . . . " (Heinich, 1970, p. 64)

Models serve purposes other than merely replicating the real-world. Models can be extremely helpful in predicting and forecasting—in finding out what changing various elements of the model will do to other parts of the model or to the model as a whole. Models fall into two broad classes: models *of* and models *for*. "[Models of] . . . are models of *explanation*. The term model *for* is prescriptive in intent, and its formulation is designed as directive." (Heinich, 1970, p. 68)

The model offered here as part of the definition contains elements of both descriptive and prescriptive models. It is strongly rooted in the real world, but anticipates and offers structure for some changes which are likely to come about as technology is increasingly applied to education and instruction. As a descriptive model, the model meets several criteria, it:

describes the field in a form which can be recognized by those who work in it;

describes the field with a scope broad enough to accommodate a range of philosophical viewpoints, and,

lends itself to further manipulation for the future.

As a prescriptive model, it offers the framework for a new approach to education and instruction showing the elements and interrelationships among these elements. As such, it has already been used to identify and categorize a variety of learning resources and the activities which lead to the development and utilization of these resources.

The model has also led to the identification of three discrete but related areas of work (see Chapter VII). The model will continue to be highly useful for prescription.

As pointed out earlier, the new definition and model directly relate to earlier definitions and descriptions of various elements of the field. The new definition has three major sections (not including the learner): Learning Resources/Instructional Systems Components, Educational/Instructional Development Functions, and Educational/Instructional Management Functions.

### Rationale for Learning Resources.

The rationale for Learning Resources has four components; classification, a broad range of resources, media, and resources by design and utilization.

*Classification.* The classification—as opposed to the simple listing—of various resources for learning is a concept basic to previous definitions. This concept became highly visible in Dale's "Cone of Experience" (1954). However, the concrete abstract axis used by Dale is only one way of classifying learning resources.

The classification of learning resources in this model was first described in the Jobs in Instructional Media Study (Wallington, *et al.*, 1970) in terms of instructional system components.

> . . . it seems that the major role of the [Learning Resources] in learning and in instruction is to transmit some stimulus or some information to the learner. In an attempt to clarify the word "transmit" we can ask some of the famous newspaper reporter's questions: What, who, where, how. These simple questions do provide a useful procedure for organizing the [Learning Resources] dimension.
>
> The questions mentioned above, when applied to the transmission of information, are as follows:
>
> (1) What information is being transmitted?
> (2) What or who is doing the transmitting?
> (3) How is it being transmitted?
> (4) Where is it being transmitted?
>
> Further, since before information can be transmitted, it must be stored, question (2) can be expanded to add the following categories:
>
> (2a) What or who is storing the message to be transmitted?
>
> By providing categories of [Learning Resources] for the answers to each of these questions, [an] organization scheme follows, based on the purpose of the [Learning Resource] . . .
>
> The category names that the model attaches to the answer to each question appear below:
>
> (1) The information being transmitted . . . . . Message
> (2) Who or what is storing or transmitting. . . . . .Man
> Material
> Device
> (3) How (through what procedures) it is being transmitted . . . . . .Technique
> (4) Where it is being transmitted . . . . . .Setting
> (pp. 291-292)

The impact of communications theory on the field strengthened the concept of classifying people and the content of a message as separate resources.

There is a strong similarity between the classifications used here and those used in the 1963 definition model (Ely, 1963;

see Chapter III, p. 36). The most important differences in terminology between the current classification and the 1963 definition model is in the definition of the category "people." In the current definition, the term, "people," refers only to persons who are transmitters of information directly to the learner, and not to people who perform the functions. Other differences are: (1) "people" replaces "man" to eliminate the use of sexist terminology; (2) the old "media-instrumentation" is replaced by "materials" and "devices"—both used as explanatory terms in 1963; (3) "techniques"—another 1963 explanatory term—replaces the term "methods;" (4) the term "environment" is replaced by "setting" and is given more specific definition. The term "message" remains. Those terms also, in the current model, include a broader perspective of Learning Resources.

*Broad Range of Resources.* The list of Learning Resource categories includes resources well beyond the previously used, restricted list of common school materials. This decision is a direct result of the previously identified concept of technology; and from the idea that: "Resources provide the breadth that encompasses the traditional audiovisual field and the recent and the future developments in the field" (Torkleson, 1965, p. 200). Limiting the range of resources consequently limits the tools available to the field of educational technology, while viewing all resources as potential Learning Resources increases the tools available for education.

*"Media."* There has been a long, historical relationship between the terms "media" and "educational technology." While the term is a popular and a viable term, it nevertheless restricts the overall concept of resources. This restriction is the result of the ambiguous connotations associated with the term, "media." While most people agree that resources for learning encompass people, many simply do not think of people as being a medium. This confusion has brought about terms such as "nonhuman instruction," "mediated instruction," which do not include instruction mediated through people. Using the term "learning resources" (and instructional system components) with "people" as one class of resources (or components) clarifies this perspective.

*Resources by Design and Utilization.* The definition indicates that resources can be "designed and/or utilized" to facilitate learning. Resources designed to facilitate learning are familiar to most people.

However, not all learning resources were designed for the specific purpose of education. There is some doubt that great novels and plays, community facilities (*e.g.*, firehouses), cultural institutions (*e.g.*, museums) were designed specifically to teach school children subjects in the curriculum. That these resources are used to help people learn makes them Learning Resources. This second class of resources, resources by utilization, is as important as resources by design.

Under this rubric—learning resources by design and by utilization—the range of learning resources becomes incredibly broad. This position is clarified in an earlier definition statement by AECT (1972, p. 38):

> Some resources can be used to facilitate learning because they are specifically designed for learning purposes. These are usually called "instructional materials or resources." Other resources exist as part of the normal, everyday world, but can be discovered, applied, and used for learning purposes. These are sometimes called "real-world resources." Thus, some resources become learning resources by design and others become learning resources by utilization. This distinction is important because it makes clear the position of "non-instructional, real-world" resources as well as designed resources as an area of concern for educational technology.

*Summary.* The above four points—classification, a broad range of resources, expansion of the term media, and the concept of resources through design and/or utilization are fundamental to the rationale underlying the concept of learning resources/instructional system components.

### Rationale for Educational Development Functions

The processes for analyzing educational problems, and for devising, implementing and evaluating solutions to those problems are identified as the Educational Development Functions.

Specific Educational Development Functions are derived from frameworks provided by the systems approach and the

instructional development process. Many different sets of functions have been identified: Ely, 1963; Silvern, 1965; Faris, 1968; Lange, 1967; Hamerus, 1968; Barson, 1967; Twelker, *et al.*, 1972 for example. These functions were synthesized in the final report of the Jobs in Instructional Media Study (Wallington, *et al.*, 1970) based on extensive job analysis research in educational technology. The study concluded that (p. 296):

> Starting with these conceptions, which all differ in some minor respects, it was possible to analyze, synthesize, and combine and finally arrive at the following list . . . [of] functions -each with a unique . . . [purpose and outcome] and set of activities:
> Research-Theory
> Design
> Production
> Evaluation-Selection
> Utilization [and Utilization-Dissemination]
> Support-Supply

The term "support-supply" was changed to the current "logistics" after the review of early drafts of NCES Handbook X on Educational Technology (NCES, 1975).

While most of the functions are obvious derivations from instructional development models, the Utilization/Dissemination function is unique. It refers to situations in which:

> . . . we are using Instructional Technology to teach about Instructional Technology [sic]. While there is no theoretical difference in *purpose* between teaching about biology and teaching about instructional technology . . . it seems that there are at least some interesting practical differences in the product [*outcome*] and the *activities*. These differences make it worthwhile to provide, in the model, a means for indicating that this special situation exists, and for indicating how it is similar to and differs from regular utilization. (Wallington, *et al.*, 1970, p. 296)

This book is an example of Utilization/Dissemination. The specific differences between Utilization/Dissemination and Utilization are found in the descriptions in Table 4.2 (p. 62).

### Rationale for Educational Management Functions.

The development functions discussed in the previous section offer a structure for designing and selecting Learning Resources

and utilizing them with the learner. Yet, each function is presented as independent of the others. There needs to be overall coordination and direction of the development function(s) either as they occur singly or in combination. The rationale for the two Educational/Instructional Management Functions—Organization Management and Personnel Management—is stated in the Jobs in Instructional Media Study report.

> While the idea of managing instruction is not a new one -school boards, superintendents of schools, principals, and others have administered, supervised, and planned the educational process for many years the concept of instructional management within the framework of instructional technology is new (Heinich, 1967). In addition, a functional approach, such as is being used in this model, to management in education is also new. Thus, there are few guidelines for organizing the management functions dimension of the model (Wallington, *et al.*, 1970, p. 24).

The study further delineates a difference in kind between the "administration of an organization" (and its implicit paperwork) and the "supervision of people,"—calling for human relations skills. Thus the study identified two management functions:

> Based on this distinction, the Management Functions are two: Organization Management and Personnel Management. It might be argued that each of these could be broken down further . . . . This might be so, however, we presently feel that not enough is known about instructional technology management (to) either identify all such (sub)functions or to make fine distinctions between them (p. 297).

*Confusion of Educational Technology and Other Concepts.* Educational technology is frequently confused with two related, but not identical, concepts: (1) technology in education, and (2) instructional technology. The rest of this chapter will explore and define these concepts to show how they differ from educational technology.

## TECHNOLOGY IN EDUCATION

Educational technology is concerned only with the processes which are performed to design and/or utilize resources to facilitate human learning. The key element is the notion of *resources to facilitate human learning.*

The concept of technology (as defined earlier in this chapter) may be applied to other aspects of the educational enterprise as well. The "complex, integrated process . . . " of technology may be applied, for example, to pupil transportation, to food and health services, to finances, to scheduling of rooms, and to reporting grades. While these are all certainly legitimate applications of technology, they are *not* educational technology.

Their focus is on the operation and support of the institutions in which education takes place, rather than being on the resources to facilitate human learning. The processes used here are best called "technology in education" and are not the same as educational technology.

## CONCEPTUAL DEFINITION OF INSTRUCTIONAL TECHNOLOGY

Commonly, the concepts of educational technology and instructional technology are used synonomously—as equivalants. In the context of the present definition, this is inaccurate. The complete definition of instructional technology is given below to clarify the differences.

*Instructional technology* is a sub-set of educational technology, based on the concept that instruction is a sub-set of education. Instructional technology is a complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems, and devising, implementing, evaluating and managing solutions to those problems, in situations in which *learning is purposive and controlled.* In instructional technology, the solutions to problems take the form of *Instructional System Components* which are pre-structured in design or selection, *and* in utilization, and are combined into complete instructional systems; these components are identified as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems and devising, implementing, and evaluating solutions are identified by the *Instructional Development Functions* of Research-Theory, Design, Production, Evaluation-Selection, and Utilization. The processes of directing or coordinating one or more of these functions are identified by the *Instructional Management Functions* of

Organization Management and Personnel Management. The relationships among these elements are shown by the Domain of Instructional Technology Model:

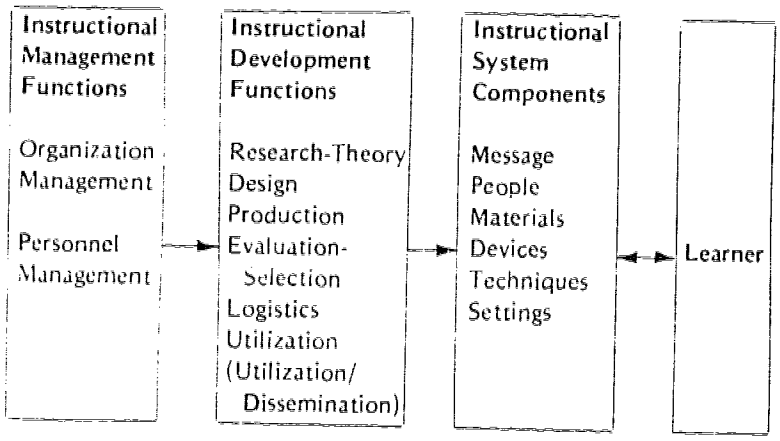



Figure 4.2
DOMAIN OF INSTRUCTIONAL TECHNOLOGY

*Sub-set.* Just as instruction is a sub-set of education (see "Underlying Concepts" in this Chapter), so instructional technology is a sub-set of educational technology. It is not concerned will all the things educational technology is—*all* the processes of education—but rather is concerned only with some of those things. The characteristics of instructional technology are specified below.

*Purposive and Controlled Learning.* While educational technology is concerned with "all aspects of human learning," instructional technology is only concerned with those situations in which the learning is "purposive and controlled." Purposive learning is learning in which someone else has determined that learning is to occur within the learner. Further, the purpose of such learning can, and must be, specified in advance. Controlled learning is learning in which the contingencies of the learner's behavior are determined and managed by someone else (Skinner, 1968). Further, these contingencies are built into the resources, and are monitored by People, Materials, Devices, and/or Techniques.

*Pre-structured.* The definitions of controlled and purposive learning lead to the next characteristic of instructional technology. The resources used by the learner are structured in advance, before the learner comes into contact with them. Both purpose and control of the learning are specified in advance.

*Design, Selection, and Utilization.* While educational technology includes all resources that are "designed and/or selected and/or utilized" to bring about learning, instructional technology sets more rigorous requirements on the resources with which it is concerned. Resources in instructional technology must meet both of the following requirements. First, the resources must be pre-designed or pre-selected in terms of the purpose of the learning and the control required for the learning. Second, they must be utilized in the manner for which they were designed or selected—*i.e.*, they must be used for the purpose specified, and they must be used in a manner which includes the element of control over the contingencies of behavior. Thus, while in educational technology any resource that meets one of the three criteria—design, *or* selection *or* utilization—is acceptable, in instructional technology a resource must meet at least two of the three criteria—it must either be designed *and* utilized, or selected *and* utilized. Further, the design and utilization, or selection and utilization, must be pre-structured in terms of purpose and control.

*Instructional Systems/Instructional System Components.* Since the resources in instructional technology must meet these additional requirements, it is not appropriate to consider them as "isolated resources." In order for all the elements above to be present, the resources must be combined into a complete instructional system. An instructional system is defined as:

> A combination of Instructional System Components (including a technique plus any one or more of the other Instructional System Components) and a specified management pattern which is pre-structured in design or selection, and in utilization, to bring about purposive and controlled learning, and which: a) is designed to achieve specified competencies or terminal behaviors for a total course of instruction; b) includes the instructional methodology, format and sequence called for in the design; c) manages the contingencies of behavior; d) includes a complete set of management procedures for

using the system; e) is replicable and reproducible, f) has been developed through the complete instructional development process, and g) has been empirically validated. (D & T Committee, AECT 1977)

In instructional technology, resources are seen as components of a complete instructional system, and are logically called Instructional System Components instead of resources.

*Inclusiveness.* All of the above differences between educational and instructional technology can be summarized by the final paragraph of Part 3 of the Definition of Educational Technology, p. 2. Thus, all of instructional technology fits within the parameters of educational technology, while all of educational technology does not fit within the parameters of instructional technology.

If instructional technology is in operation, then of necessity, so is educational technology; the reverse is not necessarily true. In educational technology, the Development and Management Functions are more inclusive because they apply to more Learning Resources than just Instructional System Components—they include all resources that can be used to facilitate learning.

## SUMMARY

This chapter has presented the conceptual definition of educational technology, which includes:

a description of its underlying assumptions and concepts;

a description of the differences between "educational technology" and "technology in education," including a definition of the latter concept;

a definition of "instructional technology" and an analysis of it as a sub-set of educational technology.

*This is not, however, the complete definition of educational technology.*

While it is a complete conceptual definition, it does not serve to define educational technology as a field or as a profession—two criteria any complete definition must meet. The next four chapters draw from this conceptual definition the definitions of educational technology as a field and as a profession.

*It must be stressed that all three definitions, rather than just the one contained in this chapter, represent the complete definition of educational technology.*

# CHAPTER V

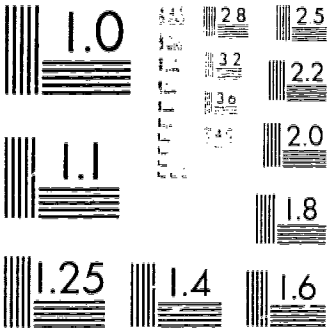
# Intellectual Technique – Functions, Combination of Technologies, Systematic Application of a Synergistic Effect

The theoretical framework provides the basis for meeting the second criterion for defining a field. It indicates the existence of a unique intellectual technique.

## TECHNIQUES OF THE FUNCTION

As identified and defined by the Domain of Educational Technology Model, each of the Educational Development and Management Functions has an intellectual technique of its own. Each function involves people, procedures, ideas, devices, and organization for identifying and solving the problems which fall within the purview of its purpose.

The intellectual technique (the way of thinking through challenges) used in the Research-Theory Function to generate and test knowledge, for example, is the scientific method. The technique used in the Design Function to create specifications for Learning Resources is the instructional development process.



## INADEQUACY OF THE FUNCTION LEVEL TECHNIQUES

While each function has its own intellectual technique, regarding educational technology as a compilation of ten isolated intellectual techniques meets neither the definition of educational technology given in Chapter IV nor the requirement of uniqueness.

*Complex, Integrated Process.* Educational technology was defined as a "complex, integrated process involved in all aspects of human learning." Each function taken in isolation does not constitute a complex integrated process, and does not deal with all aspects of human learning. Each function constitutes only part of the total process of identifying and solving all learning problems. No single function can do the job. All the functions must be operating together, in some complex, integrated form, to exemplify the process that is educational technology.

*Requirement of Uniqueness.* The intellectual techniques of each of the functions in isolation are techniques that are used by fields other than educational technology. Educational technology "makes no exclusive claim to any of these efforts; other educators believe in, and use, some of these concepts in their work." (AECT, 1972, p. 36) Therefore, the individual intellectual techniques of the functions in isolation do not meet the requirement that for a field to exist, its intellectual technique must be unique to it.

## INTELLECTUAL TECHNIQUE OF EDUCATIONAL TECHNOLOGY

The intellectual technique that does describe how all of educational technology thinks through challenges is stated in the definition. "It is the complex, integrated process involving people, procedures, ideas, devices, and organization for analyzing problems and devising, implementing, evaluating and managing solutions to these problems involved in all aspects of human learning. (p. 1)"

This technique involves the systematic integration of the individual technologies of the functions and their interrelationships into a complex, unified process. It involves examining

whole problems in all aspects of human learning and systematically selecting and utilizing the appropriate individual techniques and their interrelationships to generate required whole solutions.

The intellectual technique of educational technology does not begin by assuming that a problem is a "design" problem, a "production" problem, a "logistics" problem, or a "management" problem, and continue by applying that specialized technique to solve it. Instead, when faced with a problem, educational technology systematically integrates people, procedures, ideas, devices, and organization into a complex process to analyze the problem, decide which combinations of techniques are needed to produce solutions, implement, evaluate, and manage the solutions—all within the context of the whole problem and whole solution.

## UNIQUENESS OF THE TECHNIQUE

> Is there a field of educational . . . technology? (Heinich, 1973, p. 44)
>
> The field of educational technology, however, is unique in bringing *all* these efforts together in a systematic fashion (AECT, 1972, p. 36). The combination of these concepts in the broader context of education and society yields synergistic outcomes—behaviors which are not predictable based on the parts alone—but outcomes with extra energy which is created by the unique interrelationship of the parts. (p. 38)
>
> Educational technology is an indigenous technology that includes what has been borrowed, [and] that through a synergistic process becomes a unique and specialized technology in itself. (Wedemeyer, 1971, p. 20)
>
> In this sense, instructional technology is more than the sum of its parts. (Commission on Instructional Technology, 1970, p. 21)

We can conclude that the intellectual technique described above, and based on the theoretical framework, is indeed indigenous and unique to educational technology. There are three elements of the uniqueness.

*Systematic Integration into Complex, Integrated Process.* Educational technology combines the individual techniques

of the functions systematically into a complex, integrated process that organizes and manages the individual techniques and their interrelationships to solve problems.

*Whole Problems and Solutions.* Educational technology looks at problems and solutions in terms of the whole (or *gestalt*) of human learning. It deals with the total situation, rather than just with parts that can be identified and implemented using isolated techniques.

*Synergistic Effect.* The result of this complex integrated process and the approach of dealing with whole problems and solutions is synergy. The indigenous intellectual technique of educational technology is more than the sum of its parts—more than the sum of the individual techniques of the individual functions. The intellectual technique of educational technology produces extra energy in the effort to solve problems, and produces outcomes which are not predictable based on, or produced by, each function operating in isolation.

## SUMMARY

Each function of educational technology has an intellectual technique associated with it. However, the intellectual technology of educational technology is more than the sum of these parts. It involves the systematic integration of the individual technologies of the functions, and their interrelationships, into a complex integrated process to analyze whole problems and create whole solutions. It produces a synergistic effect, yielding outcomes not predictable based on the individual elements operating in isolation. This indigenous technique of educational technology is unique to it.

# CHAPTER VI

# Practical Application– Resources and Functions, Effects on Organizational Structures, Effects on Processes of Education

The theoretical framework provides a basis for meeting the third criterion for defining a field—it indicates the practical applications of educational technology. Three specific applications of educational technology can be identified: the resources and functions as application; the effects on organizational structures of education; effects on the specific elements of facilitating learning.

## RESOURCES AND FUNCTIONS AS APPLICATION

The most basic, and explicitly stated, practical application of educational technology is in providing and implementing solutions to problems in the facilitation of learning. According to the theoretical framework, these solutions take the form of Learning Resources. These resources—either designed or selected, and then utilized—are concrete products that are available to interact with learners. These products are the most visible evidence of the application of educational technology.

The development and management functions are also evidence of practical application. Each function has specific activities and outcomes which can be seen and measured. Thus, one

can see someone performing a needs assessment, producing a film, cataloguing materials, interacting with learners, managing other people, etc. The actual performance of the activities resulting in outcomes, is also visible evidence that technology has been applied to education.

## EFFECTS ON ORGANIZATIONAL STRUCTURES

> There is no question but that somewhere in the take-off stage, the organization pattern [of education] will change radically. (Finn, 1962, p. 71)

Educational techn[illegible]has a significant impact on the organizational structures [illegible]e institutions in which it is applied. This impact is felt in [illegible]ee ways: it changes the levels of decision making, it creates new types of instructional patterns; and it makes possible alternative types of educational institutions.

### Levels of Decision Making

When the field and profession were thought of in terms of "audiovisual aids," they had impact on only the lower levels of instructional decision making. The three levels of decision making, and the impact of "audiovisual aids" on them are shown in the following diagram:

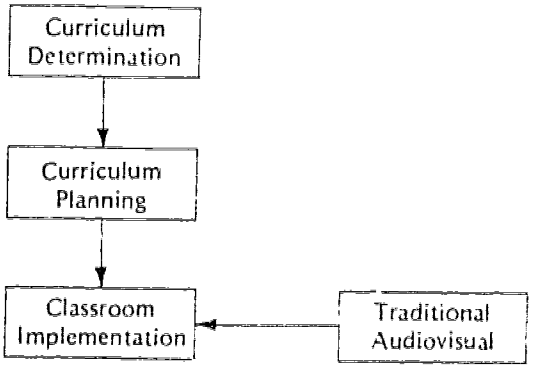



Figure 6.1
THE ENTRY OF TRADITIONAL AUDIOVISUAL AIDS INTO THE INSTRUCTIONAL PROCESS
(Heinich, 1970, p. 117)

›visual aids affected instructional decision making only
evel of classroom implementation.

concept of educational technology provided in this de-
n changes the levels at which educational technology im-
s upon education and instruction. The impact is now felt at
igher level of decision making. Heinich shows this new level
impact of educational technology in the following diagram
where educational technology affects instructional decision
making at the curriculum planning level.

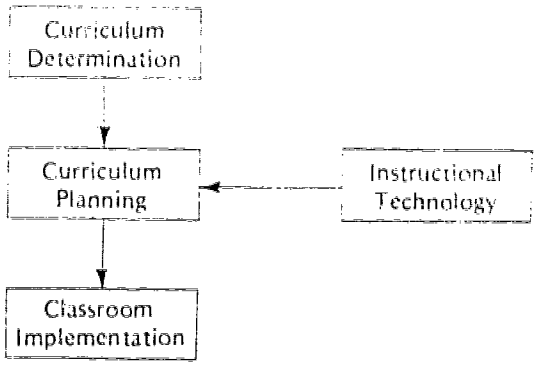



Figure 6.2
THE ENTRY OF INSTRUCTIONAL TECHNOLOGY
INTO THE INSTRUCTIONAL PROCESS
(Heinich, 1970, p. 125)

Although Heinich's diagram does not show it, there is a two-way relationship between the two highest levels of decision making. They do not necessarily flow in the linear fashion indicated. The process of curriculum planning also creates an impact on the highest level of decision making, curriculum determination. Thus, educational technology affects, at least indirectly, the highest level of instructional decision making. It does so through procedures of needs assessment, learner analysis, task analysis, and the specification of instructional objectives.

Thus, the field and profession of educational technology affect instructional decision making not only at the lowest, or classroom implementation, level but also at the middle and highest levels, curriculum determination and planning.

### Types of Instructional Patterns

There are four basic patterns into which instruction can be organized in institutions based on the present definition of educational technology.

The first, the traditional direct student-teacher relationship, involves the teacher (acting as an Instructional System Component) as the only resource. This instructional pattern is shown in the following diagram.

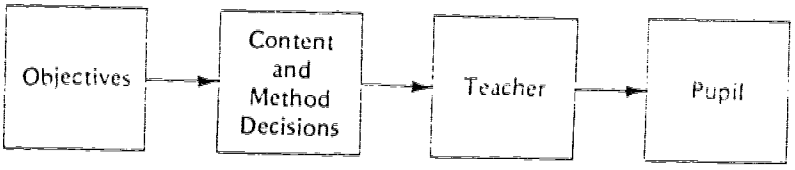



Figure 6.3
TRADITIONAL INSTRUCTION

(Morris, 1963, p. 11)

The second type of pattern involves the teacher using "audio-visual aids" to assist in instruction. In this pattern, the teacher is the primary Instructional System Component, and other resources (Materials, Devices, Techniques, Settings) are used in a supplementary manner. Morris called this "teacher with media" and showed the instructional pattern thus:

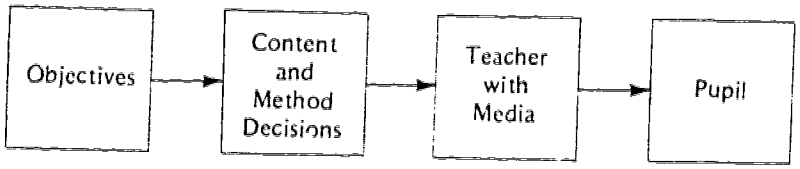



Figure 6.4
MEDIA FUNCTION NO. 1: TEACHER WITH MEDIA

(Morris, 1963, p. 11)

The third type of pattern involves the use of complete instructional systems, involving mediated instruction in which the teacher is involved in a design and evaluation-selection role, as well as in the role of providing the Utilization function for areas not covered by the instructional system. Most of the instruction is provided through predesigned instructional systems incorporating those Instructional Systems Components (Materials, Devices, Settings, Techniques) other than People. This pattern is diagrammed:

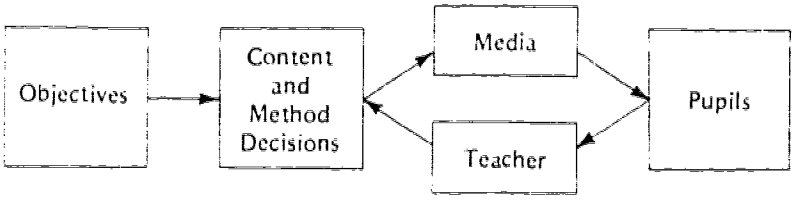



Figure 6.5
MEDIA FUNCTION NO. 2: SHARED RESPONSIBILITY FOR INSTRUCTION

(Morris, 1963, p. 12)

The fourth type of pattern involves the use of complete instructional systems, using only mediated instruction, in which the teacher plays no direct role. This "media alone" approach, not shown in Morris, would appear thus:

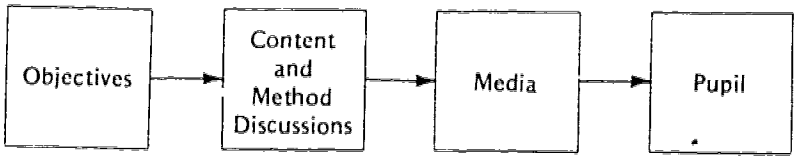



Figure 6.6
MEDIA FUNCTION NO. 3: MEDIATED INSTRUCTION

Combinations of the basic instructional patterns are possible as this summary diagram from Morris (p. 12) indicates:

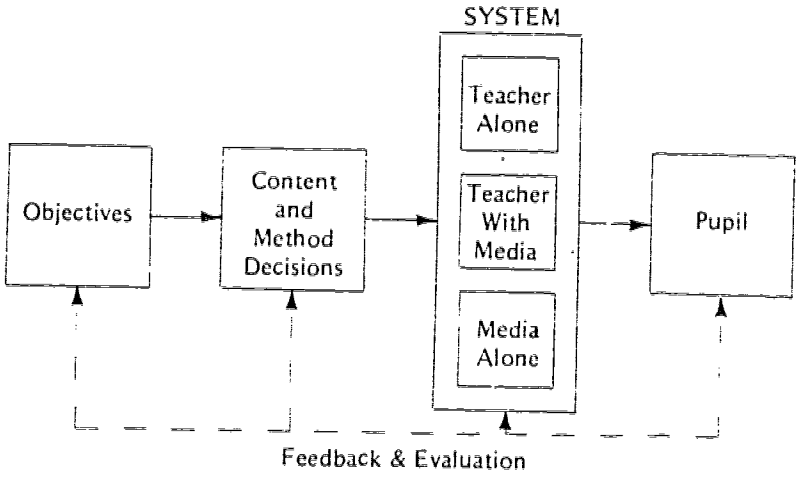



Figure 6.7
INSTRUCTIONAL SYSTEMS

Heinich's (1970, p. 147) "Model of the New Paradigm of Instructional Management" closely parallels Morris' summary diagram, but shows more closely the control relationships between classroom teachers and mediated teachers.

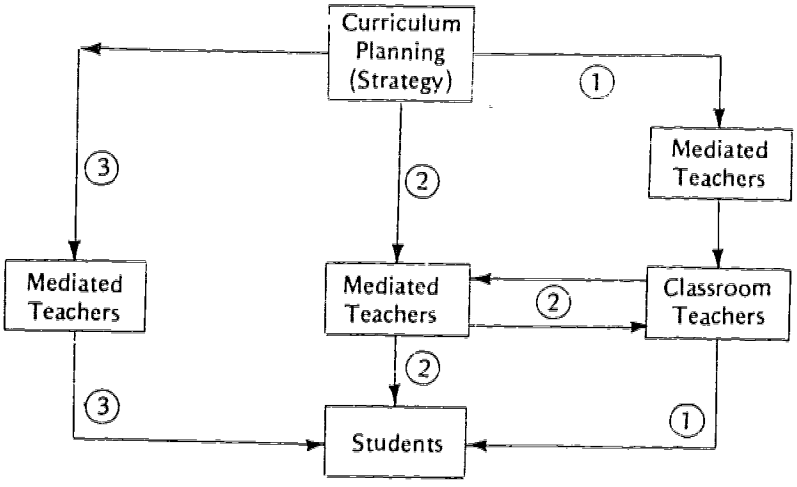



Figure 6.8
A MODEL OF THE NEW PARADIGM
OF INSTRUCTIONAL MANAGEMENT

(Numbers added to relate this diagram with Figures 6.4, 6.5 and 6.6)

Heinich refers to the traditional classroom practice as "teacher with media" (p. 147), which includes Morris' designations "traditional instruction" and "teacher with media" (Figures 6.3 and 6.4). Heinich, however, stresses that the decisions for media use *or nonuse* are in the hands of the classroom teacher and all media is under his/her control (see number 1 in Figure 6.8).

Heinich's second pattern of relationships (see number 2 in Figure 6.8) is one of "shared responsibility" between the classroom teacher and the mediated teacher. While this is similar to Morris' teacher and media (Figure 6.5), Heinich (1970) is more explicit about the control of the mediated teacher.

> This arrangement permits the system to be adaptive and yet retain the benefits of "quality teaching on a broad base" through media. Notice, however, that the mediated teachers in the center portion do not go *through* classroom teachers. In other words students have been assigned to mediated teachers for part of the time and classroom teachers for part of the time. The classroom teacher does not have the final decision as to whether or not students will experience the instructional events prepared by these mediated teachers. That was determined at the curriculum planning level (p. 147).

The third pattern (see number 3 in Figure 6.8) in Heinich's model delineates total instruction by mediated instruction. This pattern is similar to the "media alone" pattern (Figure 6.6). In this pattern, the classroom teacher (or People Instructional System Component) is not involved in the Utilization function. "Mediated instruction" neither goes "through the teacher" nor works in "shared responsibility" with the teacher. (Heinich, 1970, p. 148)

Thus, educational technology, in addition to making an impact on decision making at higher levels, also makes possible the existence of four different patterns of instruction. These patterns are summarized below, using the language of the current definition:

1. People Learning Resources/Instructional Systems Components *alone*.
2. Materials, Devices, Techniques, Settings Learning Resources/Instructional Systems Components which *function through* the people Learning Resource/Instructional Systems Component to the learner.

3. Materials, Devices, Techniques, Settings Learning Resources/Instructional Systems Components (combined into instructional products or systems incorporating "mediated instruction") which interact with the learner in *shared responsibility* with the People Learning Resource/Instructional Systems Component.
4. Materials, Devices, Techniques, Settings, Learning Resources/Instructional Systems Components (combined instructional systems incorporating *mediated instruction*) which interact with the learner *alone*, without the intervention of People Learning Resources/Instructional Systems Components.

## Alternative Types of Educational Institutions

We have noted that most frequently instruction takes place within institutions—usually called schools. In addition to affecting the level of decision making and types of instructional patterns, educational technology also affects the structures and types of these institutions. An earlier AECT definition statement (1972) noted that:

> There are at least five types of alternatives for the facilitation of learning. They differ along the dimension of formality—based on the compulsory nature of the institution, on the degree of authority of those in charge, and on the range of resources available.
>
> At the extreme formal end, there is the current school system. Its goal is to teach. Attendance is compulsory, as are most of the societally-determined objectives the learner must meet. Authority is in the hands of professional educators and the government. In addition, the resources and approaches used are limited.
>
> The second alternative moves toward informality. It is the remote, or mediated educational program. The Open University is an example of such a program. These programs are similar to the school system in authority and control, except that since the resources are brought to the learner (instead of the reverse), the authority and control are more difficult to maintain. The greater variety of resources and its individualized nature makes it slightly more informal than the school system.
>
> Moving further toward informality, there are innovative educational programs. These are characterized by open classrooms, indi-

vidualized and personalized mediated instruction, and use of resources in the community and beyond. The emphasis is usually on learning rather than teaching. While learners here have a choice among goals and objectives, the choice is small and the total range of objectives is determined by educators. In addition, all authority and control of the institution remains in the hands of educators.

A further step toward almost complete information is the free school. Here the emphasis is on non-compulsion and shared authority. Learning goals, if there are any, are determined by the learner. The "teacher" and learners have equal authority in making decisions which affect the institution. Attendance is not compulsory. Most of the resources used are those which naturally exist in the real world.

At the informal end of the continuum is the learning network. It is not an educational system or institution. It is a means for providing access to learning resources in the broadest sense—anything that can help one learn. Goals, attendance and authority all rest with the individual learner, who is free to use the network or not as the learner sees fit.

It is not important with which of these formats the educational technologist agrees, for they exist regardless of agreement or disagreement. It is important that two things be recognized about them. First, there is a definite role for educational technology in each of these alternatives. The role may differ from one to the next, but the field can serve them all through the identification, development and organization of learning resources. Second, it is the techniques and resources of the field of educational technology which make possible the existence of these alternative institutional forms for facilitating learning. The fact that some resources can be predesigned and tested, and then delivered to the learner remotely, tends to imply that the school building and the teacher need not be the only patterns for education. The fact that access to resources in the outside world can be provided implies that institutions devoted only to "instructional resources" need not limit the scope of the field any longer. The fact that alternative means for reaching learning goals can be provided, with alternative configurations of means, creates the possibility for alternative institutions. The fact that sophisticated machinery exists creates the condition for the existence of alternative institutions.

It is likely that educational technology will help to provide alternative institutional patterns for the facilitation of learning (pp. 42-43).

## EFFECTS ON EDUCATIONAL DECISION MAKING

As Heinich (1970) observed, the application of technology to education directly affects decisions made about the specific processes of education. It has a significant impact on who determines the content taught; the degree of standardization and choice of content; the quantity and quality of available resources; who designs the resources and how it is done, who produces the resources and how; who evaluates the instruction and how; who interacts with the learner and how; who assesses the learner performance and how.

*Content Determination.* Traditionally, content on a general level has been determined by school district curriculum committees or coordinators. Specific implementation is done by the individual teacher or instructor. Educational technology shifts the determination of content to the curriculum strategy and determination levels—to a large degree, out of the hands of the individual instructor, and to a lesser degree, out of the hands of the curriculum committee.

The content of the mediated instruction of *Sesame Street,* and *Physical Science Study Committee Physics Course* (used by elementary and secondary schools) and *The Ascent of Man* and *The Adams Chronicles* (used chiefly by colleges) was not determined by *local* curriculum groups or individual instructors. It was, instead, determined by those content specialists, instructional developers, and materials producers who produced these units of instruction. These content determiners were operating at a national, rather than local, level and independently of the prescribed curricula of individual educational institutions.

When content specialists, instructional developers, and materials producers determine the content of courses of instruction, the role of the local curriculum committee and individual instructor becomes one of content and course selection rather than determination.

*Standardization and Choice.* "One of the strongest trends in the next decade will be a general move toward standardization . . . " (Finn, 1966, p. 49) This prediction has begun to come true, though not as quickly as predicted. With the increasing utilization of mediated instruction, more and more institutions in different locations, with different local needs and

philosophies, are beginning to offer the same instruction. In the Chicago area alone, for example, at least five different universities offer *The Ascent of Man* as a course for college credit. These institutions serve different student bodies and would probably have difficulty in agreeing on common course content were it left to a committee. Yet, these institutions now offer essentially the same course—in content and delivery—in a standard format available from the Public Broadcasting System.

Standardization does not necessarily mean that all institutions will offer the same course. As increasing amounts of mediated instruction are developed—especially with several different courses being produced on the same subject—institutions will begin to have some choice in course selection. For example, the Biological Sciences Curriculum Study (BSCS), recognizing several different approaches to the study of biology, produced several courses, each using a different approach. An institution can choose the course that meets its philosophy of how biology ought to be taught. Thus, concomitant with the standardization of instruction is a trend toward choice among standardized courses of instruction.

*Quantity and Quality.* The choices available to a district, an institution, or a teacher/professor decrease, however, when mediated instruction is utilized. This occurs because the number of mediated courses on the same subject will necessarily be fewer than the number of traditional, "teacher-taught," courses. That is, the quantity of available courses will decrease. Given the time, expertise, and cost needed to produce mediated instruction, and the size of learner body that must be served to make the instruction cost-effective, there will have to be a smaller number of mediated courses produced than would be produced by each individual district or teacher/professor.

With the decrease in quantity, however, comes a corresponding increase in quality. Because of the level of expertise of the content specialists, instructional developers, and materials producers, and the time and money used to produce mediated instruction, these courses will necessarily be of higher quality than those that can be produced by the individual teacher with limited resources.

*Design of Instruction.* Both the people who perform Design activities and the techniques they use will change with the advent of mediated instruction. In the traditional "classroom teacher alone" paradigm, an individual designed the instruction using a traditional lesson plan method, with textbooks serving as primary resources and with "audiovisual aids" sometimes supplementing the instruction. The design of mediated instruction, however, usually is conducted by an expert in the instructional development process, including the assessing of needs, the analysis of learners, the performance of task and content analysis, the writing of behavioral objectives and criterion-referenced tests, the sequencing of instruction, the systematic selection of learning resources, and the development of specifications for effective resources. There is a shift from the designer as primarily subject matter specialist to the designer as a person trained in the methods of instructional development. The process used by this person will be the systematic instructional development process, rather than the intuitive approach used by most teachers/professors.

*Production of Instruction.* The people who perform production activities, as well as the techniques and quality of their production, will also change with mediated instruction. Simple, instructor-produced resources will give way to units of mediated instruction done by specialists in producing different media—audio, photography, film, television. These people use sophisticated production techniques and equipment, and, unlike the teacher/professor, their training consists of learning these techniques and use of equipment rather than learning content.

*Evaluation of Instruction.* The evaluation of instruction—as opposed to learner assessment—is a function often neglected in traditional instruction. In educational technology and particularly in mediated instruction the evaluation function assumes a primary role. Instruction is evaluated both in its developmental stage and while in wide scale use to determine its effectiveness and to locate areas needing revision. The evaluation function is carried out by specialists in the areas of evaluation models, techniques of formative and summative evaluation, and evaluation instrument construction. Again, this person is not the

teacher/professor, but one who is specially trained in these techniques.

*Interaction with the Learner.* Mediated instruction radically changes the purposes for, and people who perform, the utilization function activities. In traditional instruction, the instructor interacted directly with the learner. In mediated instruction, especially in the presentation of information, this is done by the resources other than people. One possible role for interaction with the learner is the facilitation of social and emotional growth. A second possible role for interaction is that of tutoring—of providing special remedial assistance to those students who do not learn from the mediated instruction. The kinds of people needed to fulfill these two roles are different from the current classroom teachers. The facilitation of social and emotional growth is best done by a person who is warm, empathetic, and has expertise in the areas of human growth and development and of counseling. The functioning of tutoring (as several recent studies have indicated) is often best accomplished by peers who are more familiar with the problems of learning something than are experts. (Finn, 1961)

*Assessment of Learning.* A second aspect of the utilization function changed by mediated instruction is the assessment of learners. Traditionally, the testing of learners to determine if they had met the learning objectives was done by teachers, using fairly unsophisticated methods—*e.g.*, multiple-choice tests, papers, projects. In addition, these tests were often thought of as being separate and distinct from the instruction and were frequently not based on the objectives of the instruction. With mediated instruction, however, the techniques of learner assessment are built into the instruction. They are not an adjunct, but are integral—often determining whether or not remedial instruction is needed before the learner progresses on to the next lesson. Thus, the development of the assessment instruments is built into the development of the instruction, and is performed by the same content specialists and instructional developers who design the instruction.

Traditionally, also, the teacher was the person who graded the tests. However, with mediated instruction (such as in the

British Open University system) the assessment of learners may be done by clerks (for multiple-choice tests), other students (a model long used in higher education with teaching assistants), or specially designated assessors who, provided with an answer key from the course designers, correct the tests. In each of these cases, the assessment of learners is done by a person whose academic credentials are considerably below those of the teacher.

*Role of the Teacher and School System.* The result of all the practical applications, according to Finn, is that it "is now possible not only to eliminate the teacher, but also the school system." (1960b, p. 16) This position is rather extreme, but it does serve to point out that, with the application of educational technology, the role of the teacher and the school system will change drastically. The school system will be faced with alternative institutions to facilitate learning, as well as with changes in the traditional role of content determination. The teacher will be faced with experts who are performing the teacher's traditional roles of content determination, design and production of instruction, interaction with, and assessment of, learners. Speculation about the role of the teacher in light of this reality is beyond the scope of this definition. However, it is clear that the new role will differ drastically from the present role.

## SUMMARY

Educational technology has practical applications. The existence of learning resources, and the performance of the development and management functions, constitute the most basic and explicit evidence of this practical application. In addition, the application of educational technology affects the organizational structure of education:

it moves the impact of educational technology to the curriculum strategy (and perhaps determination) level;

it permits four types of educational patterns—people resources alone, other resources function through people, people in shared responsibility with other resources (combined into educational systems using "mediated instruction"), other resources ("mediated instruction") alone;

it makes possible the existence of alternative institutional forms for facilitating learning, and can serve all these types of alternative institutions.

These applications have significant impact on the specific processes of education. They change the techniques of doing, and the people who do, content determination (including standardization, choice, quantity, and quality), design, production, and evaluation of instruction, and interaction with, and assessment of, learners. The result is a drastic change in the role of school systems and the individual teacher.

# CHAPTER VII

# Certification and Training

## INTRODUCTION

Applying theory to the practical affairs of humankind requires people—practitioners within a field. Getting things done requires workers with varying degrees of skill to perform tasks which range from simple to complex. A profession in a field bears the responsibility for setting the guidelines for the performance (through certification and inspection) and training (through accreditation of programs) of the practitioners. Certification and accreditation relate directly to Finn's criteria for a profession.

## CERTIFICATION

The field of educational technology is so broad in concept as to defy a single set of certification standards for all practitioners or a single training program for those practitioners. AECT, as the association most directly concerned with the application of technology to education and instruction, has taken the first steps in certification by identifying and structuring three emerging specialty areas for certification and training. These areas were first identified by Heinich (1973) in his presidential address to AECT's annual convention.

> Yes, there *is* a field of educational communications and technology with a large cluster of professional specialties that logically belong within our historic purview (p.46).

Heinich espoused the concept of multiple roles for those actively engaged in educational technology. The traditional role of providing media services was still viable and a key to the successful application of technology, but it was only one of three major roles, which according to Heinich (p. 46) are:

Curricular and Instructional Design

Instructional Product Design

Media Services

These three areas became the basis for the development of AECT's certification efforts. The development of the certification standards was unique in that:

the specialty areas were directly related to a cohesive, integrated definition and model of educational technology;

task statements (competencies) were used to form the certification standards—task statements which were based on previous job analysis research and synthesis with other task information;

a distinction was made between the different levels of work performed and an attempt to relate tasks at the various levels—thus creating a pattern for career development and related training.

Each of the three foregoing features merits further comment with regard to each of the three specialty areas in educational technology.

## DEFINITION OF THE SPECIALTY AREAS IN TERMS OF THE MODEL

The specialty areas are directly related to the model through the clustering of tasks in the functions in the Domain of Educational Technology. Note the following definitions (AECT Task

Force on Certification derived from Prigge, 1973 and 1974, Bergeson; 1973).

*Instructional Program Development* (called "Curricular and Instructional Design by Heinich, 1973), is that area which attacks the broader problem of developing a complete system of instruction—whether a course, a year's curriculum, or a multi-year plan for instruction. It implies a total application of technology and mediated instruction to facilitate learning. Instructional Program Development is primarily composed of tasks/competencies within the functions of Design, Utilization/Dissemination, Research-Theory, and Utilization with secondary tasks/competencies in the functions of Evaluation-Selection, Organization Management, and Production.

*Media Product Development* (called Instructional Product Development by Heinich, 1973) is that area which deals with the production of specific packages of mediated instruction. It involves the translation of specific instructional objectives into concrete items which facilitate learning. Media Product Development is primarily composed of tasks/competencies within the functions of Design and Production with secondary tasks/competencies in the functions of Research-Theory, Utilization/Dissemination, and Personnel Management.

*Media Management* (called Media Services by Heinich, 1973) is that area which deals with the ongoing support services provided for both faculty and learner as they engage in the instructional process. Media management is principally a "responsive" type of service which includes aspects of the location and selection, acquisition, organizing, storage, retrieval, distribution, and maintenance of both materials and devices. Media Management is primarily composed of tasks/competencies within the functions of Organization Management, Personnel Management, Utilization/Dissemination, and Logistics with secondary tasks/competencies in Evaluation-Selection, Research-Theory, Design, Production, and Utilization.

The strength of this approach is that the definitions of the functions and their relationship to learning resources, instructional system components, and other functions are demonstrated in the overall structure for educational technology.

## USING TASK STATEMENTS

Employing a task approach conforms to one of Galbraith's (1967) imperatives of technology—the division of work into specialized tasks requiring different levels of skill on the part of the workers. The identification and subsequent standardization of tasks is necessary to the application of technology to any field. Education and instruction stand to benefit from this approach.

Since the foregoing definitions rely heavily on the concepts of tasks and competencies, some further comments are in order. (For an extended discussion of the interrelationships of tasks, competencies, certification, accreditation, and quality control in a profession, see pp. 41-44 in *Guidelines for the Certification of Media Specialists,* extended version, AECT, 1972.) A task here is taken to mean actual work done. A competency is a person's ability to perform that task. Using tasks as the basis for certification permits training programs to be designed to teach those skills needed to perform the task. The task then becomes the common denominator between certification and accreditation.

In this approach the source of the tasks becomes a critical issue. Tasks selected for certification must have some relationship to successful practices within the field. The tasks/competencies used by AECT for the three areas of certification were synthesized from a number of sources relying particularly on two research studies which gathered tasks from actual onsite job analyses. Further benefits for training accrue since the wealth of task-related information gathered lends itself directly to the design of training programs. (For specific information about this translation of task information into curriculum, see Hyer *et al.*, 1971, pp. 408-439).

## DISTINCTION BETWEEN LEVELS OF WORK

The tasks/competencies for certification and accreditation are grouped not only by specialty areas (instructional program development, media product development, media management) but also according to levels of difficulty. This is a relatively new application of a concept which derives from the new careers and

job ladders. It is, again, consistent with the technological concept of division of labor. One special advantage of such an approach is that it is integrative—it considers the whole of a work process, analyzes the tasks involved, and separates them into levels. AECT has identified three general levels called (from lowest to highest) aide, technician, and specialist. The essential differences between the levels are instructions which the worker needs to complete the task successfully. A complete table of Worker Instructions and the levels of Worker Instructions for each general level is in Prigge (1974, pp. 12-16). The specialty areas and the three levels of worker form a matrix.

| *Specialty Areas* / *Levels* | Instructional Program Development | Media Product Development | Media Management |
|---|---|---|---|
| Specialist | | | |
| Technician | | | |
| Aide | | | |

Figure 7.1
CERTIFICATION SPECIALTY/WORKER LEVEL MATRIX

A simplification of the differences between the three levels is that a person can master most aide level tasks after a short period of training, often done on the job. Technician level tasks require longer training with the mastery of a number of established procedures to produce a resultant product or service along with mastery of some related theory. Specialist level tasks require even longer periods of time and the mastery of theory from which to derive procedures and to make plans and decisions in areas where there are no established practices. The definitions for each level are:

aide. A level of work in which the worker receives specific instructions for the tasks to be performed. The task may be only part of a process, other parts of which the aide cannot or does not control. An aide can be trained for a task in a relatively short period of time, since almost everything s/he needs to know is contained in the task. An aide is not required to solve problems

external to the task. If something happens which is not covered by the instructions, the aide asks for help and cannot be held responsible for solving the problem. (After Wallington *et al.)*

technician. A level of work in which the worker receives instructions in terms of a specific output (product or service). The technician has a choice of established procedures, routines, (sequences of tasks) or definite guidelines to produce the stated output. Technicians have far more freedom than aides in choosing tasks to be done and are responsible for the output only when it has been clearly specified and when the procedures for producing the output either exist or can be easily derived from existing guidelines. (After Wallington *et al.)*

specialist. A level of work in which the worker receives only general (and sometimes vague) instructions, often stated in terms of a problem or potential need. The specialist must then analyze the problem and determine the actual needs before setting goals or finding a solution. S/he is often forced to rely heavily on theory and generalizations to develop the procedures and tasks which will help to reach those goals. (After Wallington *et al.)*

Inasmuch as aide level tasks vary widely, may change to meet short-term or organizational demands, and can be learned on the job, there is doubt about the need for a national certification. Consequently, AECT has not established certification or accreditation standards for the aide level. A listing of tasks/competencies for the technician and specialist levels in instructional program development, media product development, and media management is found in the November 1974 issue of Audiovisual Instruction.

The training model shows: the changing focus of attention as a worker moves up the worker levels; the possibilities for both horizontal and vertical mobility in educational technology; the types of training needed for horizontal and vertical mobility.

To understand the model, look at it as would workers entering the aide, technician and specialist levels. For each of the three levels, there is information about (1) how the worker currently performs tasks at that level; (2) what *vertical* mobility is required to reach that level and the type of training needed; and (3) what *lateral* mobility at that level entails and the type of training needed.

### Aide Level

*Aide Focus and Task Performance*

The aide focuses his/her attention on discrete activities of the Domain Functions. (See Figure 7.2.) Note that the Outcome and Purpose columns of the figure do not apply at this level. For example, one of the tasks at this level might be "Filing of broadcast logs according to date due." The aide is concerned merely with correctly filing the information, and not with how the information is used nor how it contributes to the overall purpose of the organization for which s/he works. The job at the aide level is made up of many such discrete activities—activities which usually are (but might not be) similar in terms of educational technology functions.

*Lateral (Career Lattice) Mobility Within the Aide Level*

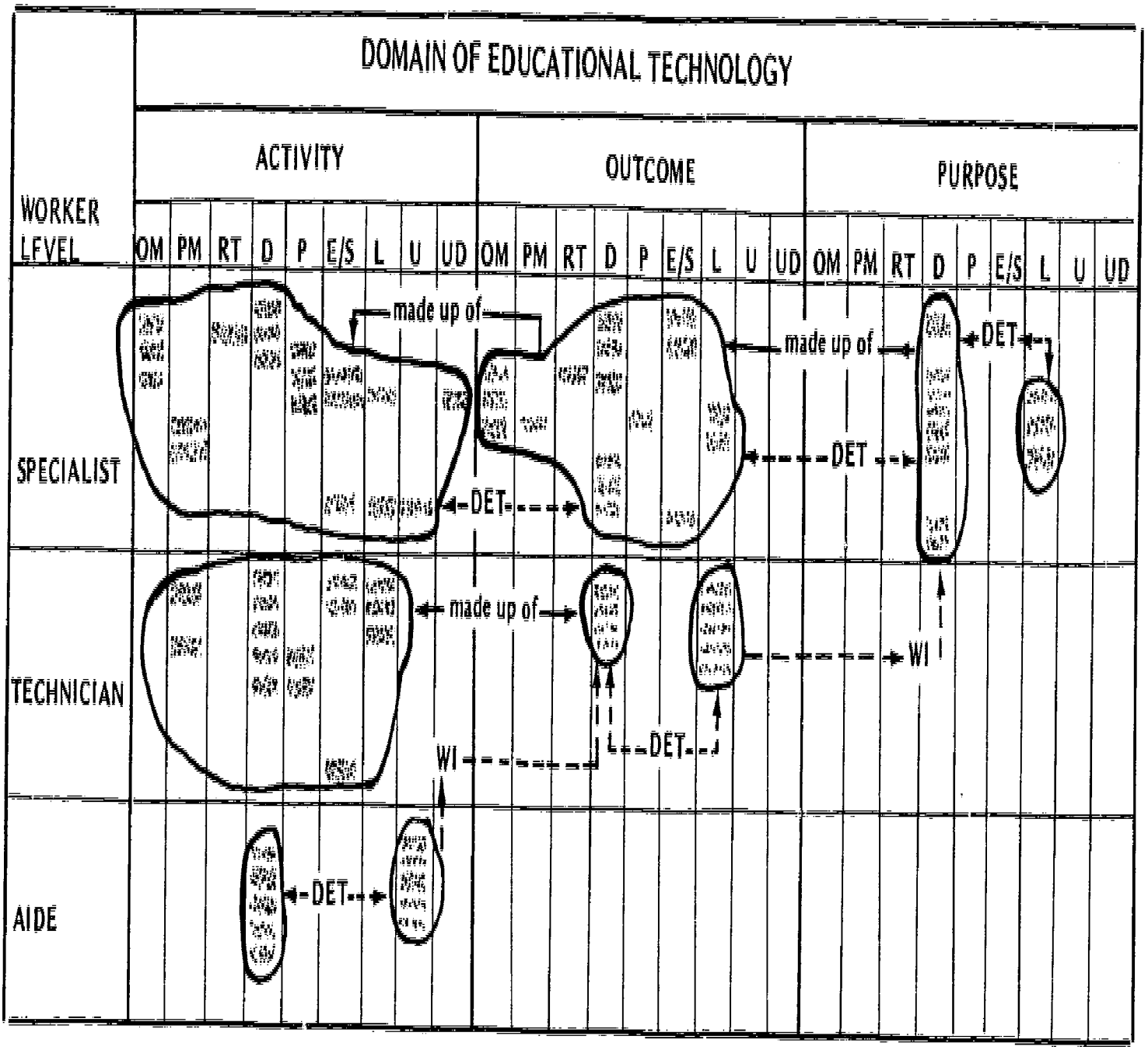
It is the lateral mobility from a job ladder in one function, *e.g.*, Design, to a job ladder in another function, *e.g.*, Production, which gives the "lattice" effect. A lattice is merely a set of job ladders connected horizontally for lateral mobility as well as vertical mobility.

Let us take as an example a worker in an aide position which involves performing exclusively minor clerical activities such as filing, typing and other routine office procedures. This worker wants to move to another aide level job, but to a job which involves checking materials in and out of an instructional materials center. According to the Domain of Educational Technology, the clerical activities would be classified as Organization Management activities and the checking activities as Logistics activities. Therefore the aide level worker would move from performing Management activities to performing Logistics activities.

To make the change, specific content training from the Domain of Educational Technology is needed. Since the worker is at the aide level, s/he would be trained for each discrete Logistics activity which s/he would be required to perform on the job.

Figure 7.2

TRAINING AND CAREER LADDER/LATTICE MODEL




TYPE OF TRAINING: DET = Specific Content Skills

WI = Worker Instruction or Responsibility Skills

= Task S' ment

Broken lines indicate skills/training for vertical and lateral mobility

## Technician Level

### *Technician Focus and Task Performance*

The technician level job structure is radically different from that of the aide level job structure. The technician is responsible *not* for discrete activities, but rather for a group of outcomes, *each of which is the result of a number of activities.* The outcomes that make up the technician level job are usually, but not always, in the same function of the Domain of Educational Technology. The activities which make up each outcome, however, are generally from many different functions. In reference to Figure 7.2, the technician level portion indicates that the Design outcomes involve technician activities from different functions such as Personnel Management, Design, Production, Evaluation-Selection, Logistics and others. Note that the purpose column does *not* apply at the technician level.

The example of filing used in the previous discussion of the aide would be differently stated at the technician level since we are now dealing with outcomes and not with activities. The outcome might be stated as " . . . to keep program records." There might be any number of activities needed to reach this outcome—activities such as " . . . prepares forms; copies data heard on broadcast; files forms; asks other personnel to write down information." These are aide level activities to meet the technician level outcome of " . . . to keep program records."

### *Vertical (Career Ladder) Mobility to Reach the Technician Level*

The changes in the focus of the job and in the procedures for task performance at the technician level require some additional types of training.

In order to learn the responsibility skills needed to change from dealing only with activities to dealing with outcomes, *worker instruction* training is needed. The worker must learn to select his/her own input, synthesize his/her own work procedures, assign work to others, use theory, and, to some extent, determine his/her own feedback.

Since the outcomes are made up of specific and varied activities, and since the worker must know the standards and procedures of educational technology which must be selected

and applied in the job, *specific content* training is needed. For example, in order to meet the outcome, "To edit Instructional System Components," the worker must know the criteria for good Instructional System Components and what editing procedures are necessary in order to correct bad Instructional System Components.

*Lateral (Career Lattice) Mobility*
*Within the Technician Level*

As with the aide level, lateral mobility involves specific content training in the function to learn both the standards and procedures for the outcomes of the new function and the new activities which make up those outcomes.

### Specialist Level

*Focus and Task Performance*

Jobs at this level are no longer made up of discrete activities as they are at the aide level, nor even of groups of outcomes as they are at the technician level, but of groups of purposes. Each of these purposes is, in turn, made up of a sequence of activities and related outcomes. Some of these activities may be at the specialist level (high levels of Worker Instructions). The specialist will probably perform these him/herself. Some activities may be at a lower level, in which case the worker may be responsible for assigning these activities to aide or technician level personnel, and then for *supervising* their outputs. An example for specialists similar to the aide and technician level examples would read "To know what programs have been aired." Only one of the outcomes for that purpose would be "To keep program records."

*Vertical (Career Ladder) Mobility*
*To Reach the Specialist Level*

To move from the technician to the specialist level, the worker must undergo a process similar to that used in moving from the aide to the technician level—training in responsibility skills and content skills. The training is, of course, at a higher level. The worker must now accept responsibility for dealing with entire purposes and problems and must devise, rather than

merely select, the standards, input, procedures, tools and equipment, feedback, and theory to be used. The specialist must be able to perform, monitor, and/or supervise the broad range of outcomes that make up each purpose and the broad range of activities which make up each outcome.

*Lateral (Career Lattice) Mobility*
*Within the Specialist Level*

Lateral mobility involves content training to learn all the outcomes that make up each purpose, *e.g.*, "what are all the steps necessary to complete a feasibility study on a new teaching machine?" and the activities which make up each outcome.

*Summary*

The training and career ladder/lattice model, then indicates how personnel in Educational Technology can move from job to job both laterally and vertically, and how they must be trained to make these transitions.

The complexity of the model may at first seem too great for those used to developing curriculum from content outlines with little regard to tasks to be performed on the job, ignoring the differences among different level tasks, and the mobility from one level job to another. However, such complexity is necessary to effectively train and promote qualified workers in educational technology.

While the foregoing material sets a thorough structure, terminology, and definitions for performance, for training, for certification and accreditation, it may seem at first glance that some areas have been omitted. Two terms in particular do not appear—"professional" and "generalist." The omission is deliberate.

Not using the term "professional" mitigates the confusion between the professional as a level of competency and as a person who accepts money for performance of certain work. The term specialist as used in relation to task level most closely approximates the former definition for "professional." The term specialist is used to *denote* (no matter what the connotations are) a level of complexity for some tasks and by extension, the competency of the person who performs those tasks successfully.

The term "generalist" can indicate either scope of work or a level of competency (Chisholm and Ely, 1975). Since only three task/competency levels have been established and related to criteria such as worker instructions, the second usage (level of competency) becomes dysfunctional. It also contravenes the use of "generalist" in the medical sense, where the term is often used. There, the specialist is a generalist who has additional training. There is a tendency for the term "generalist" to connote certification or training in more than one of the three specialty areas. This usage, however, is not officially approved by AECT.

The concepts of staff, personnel, and jobs have not been overlooked. Jobs are considered to be clusters of tasks in a specific institutional or organizational framework. Staff and/or personnel are the people who perform those tasks. It should be noted that the foregoing terms, aide, technician, and specialist, actually refer to levels of tasks—not levels of personnel. In practice, however, the terms are often applied to the people performing the tasks. This distinction between task and worker is critical because a task maintains its level of complexity no matter who performs it. Thus a specialist working at aide level tasks is considered *during the performance of those tasks* as an aide, not a specialist.

## THE PRACTICE OF CERTIFYING AND ACCREDITING

The actual practice of certification and accreditation may be done either by the profession—directly through a professional association (as in the case of the American Society of Association Executives) or through an organization created by the profession especially for this purpose (as in the case of the National Council for Accreditation of Teacher Education—or by a governmental agency (as in the case of teacher licensing) usually with the assistance of the profession. In some cases, the practice is a mix of both of the foregoing. AECT is currently working with other agencies for certification of the three specialties—instructional program development, media product development, and media management. Concurrently, it is investigating the feasibility of direct certification and accreditation. The use of a task/competency approach forms the backbone of this effort.

## TRAINING

Specialized, field-related training of people to meet job requirements has continued to increase because of the following major factors:

the identification and structuring of three educational technology certification areas;

the use of task statements to identify competency specifications for each of the certification areas;

the identification of three general levels of work to be performed;

and the necessity of actually practicing certification and accreditation.

AECT has been active in developing general training guidelines. A model for training general work level (worker instruction) skills and content skills which enables the learner to progress from level to level has been developed and exists in the final report of the Jobs in Instructional Media Study (Hyer, *et al.*, 1970).

The training model is based on the two following assumptions: (1) each DET function consists of activity, outcome and purpose (see Tables 4.2 and 4.3); (2) each of the three levels of worker, aide, technician and specialist, is concerned with a different component of the function. The concerns are: aide—activities; technician—outcome; specialist—purpose.

## SUMMARY

There is a competency-based framework for training people who perform tasks in educational technology. The framework is based on grouping of tasks from various functions within the domains of educational and instructional technology. The groupings reflect specialties within the field as well as levels of performance within the specialty area. The specialties are instructional program development, media product development, and media management. The three levels of task complexity are aide, technician, and specialist. AECT currently has guidelines for training programs for and certification of technicians and specialists in each of the three specialty areas, and is developing procedures for the implementation of those guidelines.

# CHAPTER VIII

## Professional Associations

The professional association and all that it does is a key characteristic of a profession. Along with serving as a means of communication among members of the profession, the association is the agent for bringing into operation other characteristics of a profession such as standards, ethics, training and leadership.

At the time when the field was more or less limited to the concepts of visual education and audiovisual education, one association (then called the Department of Audiovisual Instruction) could speak for the field. As the concept of communications and instructional materials of all sorts became more prevalent, the number of professional associations representing the field also increased. With the concept of educational technology as a pervasive whole which reaches throughout education, almost all educational associations have become involved in some facet of educational technology. For example, the American Association of School Administrators, recognizing the inpact of *technology in education* (as opposed to educational technology), has issued a publication about technology and the administration of schools. The Music Educators National Conference has issued publications on using technology to teach music. However, only one association, the Association for Educational Communications and Technology, has as its stated goals the application of technology to education and instruction.

## AECT

The Association for Educational Communications and Technology (AECT) had its origins in the Division of Visual Education begun in 1923. Until recently, AECT was called the Department of Audiovisual Instruction (DAVI). The development of the association reflects the development of the field from visual education to educational technology. In that time, AECT has developed into the agency primarily responsible for the implementation of the characteristics of a profession for educational technology.

*Communications with members and the field.* The Association's *Journal of Educational Communications and Technology* (formerly *A V Communication Review*) is over 20 years old and highly regarded in the field. *Audiovisual Instruction*, the Association's journal of practical applications of media and technology to instruction, is widely read by both members and nonmembers. In addition, AECT maintains communications with its members through other, nonperiodic publications and through an annual convention and regional meetings.

*Ethics* embodied in a code of ethical behaviors is a key factor in a professional association. AECT has just completed a new code of ethics along with procedures for the review of the behavior of its members. This is considered a hallmark of professional responsibility. AECT's Code of Ethics appears at the end of this chapter.

*Standards* are evidenced through the publication of standards. In the last three years alone, AECT has new (1975) standards for school (K-12) media programs; newly revised standards for the cataloging of nonprint materials; standards for learning resource programs in two-year colleges; technical standards for audiocassettes; and standards for media training in teacher education programs and advanced programs in educational media.

*Leadership* is evident through the standards of the association as well as through participation in joint groups such as the Educational Media Council and the Joint Council on Educational Telecommunications. AECT was chosen by the

National Center for Education Statistics to develop a handbook of definitions and terminology for educational technology. In 1977, AECT will host, as the representative of the United States, the International Council on Educational Media. AECT develops the leadership capabilities and responsibilities of individual members through the annual Lake Okoboji Educational Media Conference and through national and regional leadership seminars. Leadership is also a goal of the Association's special foundation, the Educational Communications and Technology Foundation.

*Training* is performed mostly through colleges and universities for which the Association has developed standards for training programs. Additionally, some training seminars are conducted at the Association's annual convention and at regional meetings and workshops. AECT is currently developing continuing education programs for its members by offering courses and certification. In the past year, task competencies for media management, instructional program development, and media product development have been identified and will serve as the basis for training and certification programs.

*Cooperation with other associations* pervades the foregoing activities. Most standards (such as the standards for school media programs) have been developed in conjunction with other associations. Some of the workshop and seminar activities are developed with other associations. AECT assists states in the formation of certification programs. The development of a handbook of definitions and terminology for educational technology directly involved 19 other education and media organizations. Finally, the participation of AECT in consortia and joint councils offers testimony to a commitment to interdependence with other associations related to education and technology. As technology plays an increasing role in education and instruction, the interaction between AECT and other associations will inevitably increase and lead to a concerted attempt to improve education through the application of technology.

*Acknowledgement as a profession.* Educational technology acknowledges itself as a profession through its professional association and its activities.

## SUMMARY

There is at least one professional association directly concerned with educational technology—the Association for Educational Communications and Technology. In addition to facilitating communication (through publications and meetings) it has served as the agency for the development and implementation of a code of ethics for practitioners in educational technology; standards for institutions in and practices in educational technology; guidelines for training and certification of practitioners in the field of educational technology; leadership activities within the field and for its own members; communications and interaction with other associations and organizations concerned with the application of technology to education and instruction.

## AECT CODE OF ETHICS

### PREAMBLE

1. The Code of Ethics contained herein shall be considered to be principles of ethics. These principles are intended to aid members individually and collectively in maintaining a high level of professional conduct.

2. The Professional Ethics Committee will build documentation of opinion (interpretive briefs or ramifications of intent) relating to specific ethical statements enumerated herein.

3. Opinions may be generated in response to specific cases brought before the Professional Ethics Committee.

4. Amplification and/or clarification of the ethical principles may be generated by the Committee in response to a request submitted by a member.

### SECTION I. COMMITMENT TO THE INDIVIDUAL

In fulfilling obligations to the individual, the member:

1. Shall encourage independent action in an individual's pursuit of learning, and shall provide access to varying points of view.

2. Shall protect the individual rights of access to materials of varying points of view.

3. Shall guarantee to each individual the opportunity to participate in any appropriate program.

4. Shall conduct professional business so as to protect the privacy and maintain the personal integrity of the individual.

5. Shall follow sound professional procedures for evaluation and selection of materials and equipment.

6. Shall make reasonable effort to protect the individual from conditions harmful to health and safety.

7. Shall promote current and sound professional practices in the use of technology in education.

8. Shall in the design and selection of any educational program or media seek to avoid content that reinforces or promotes sexual, ethnic, racial, or religious stereotypes. Shall seek to encourage the development of programs and media that emphasize the diversity of our society as a multi-cultural community.

## SECTION II. COMMITMENT TO SAFETY

In fulfilling obligations to society, the member:

1. Shall honestly represent the institution or organization with which that person is affiliated, and shall take adequate precautions to distinguish between personal and institutional or organizational views.

2. Shall represent accurately and truthfully the facts concerning educational matters in direct and indirect public expressions.

3. Shall not use institutional or Associational privileges for private gain.

4. Shall accept no gratitudes, gifts, or favors that might impair or appear to impair professional judgment, or offer any favor, service, or thing of value to obtain special advantage.

5. Shall engage in fair and equitable practices with those rendering service to the profession.

## SECTION III. COMMITMENT TO THE PROFESSION

In fulfilling obligations to the profession, the member:

1. Shall accord just the equitable treatment to all members of the profession in terms of professional rights and responsibilities.

2. Shall not use coercive means or promise special treatment in order to influence professional decisions of colleagues.

3. Shall avoid commercial exploitation of that person's membership in the Association.

4. Shall strive continually to improve professional knowledge and skill and to make available to patrons and colleagues the benefit of that person's professional attainments.

5. Shall present honestly professional qualifications and the evaluations of colleagues.

6. Shall conduct professional business through proper channels.

7. Shall delegate assigned tasks only to qualified personnel. Qualified personnel are those who have appropriate training or credentials and/or who can demonstrate competency in performing the task.

8. Shall inform users of the stipulations and interpretations of the copyright law and other laws affecting the profession and encourage compliance.

9. Shall observe all laws relating to or affecting the profession; shall report, without hesitation, illegal or unethical conduct of fellow members of the profession to the AECT Professional Ethics Committee; shall participate in professional inquiry when requested by the Association.

In addition, AECT has procedures for the implementation of this Code.

# CHAPTER IX

# Societal Context– Concerned Profession, Humanism, Relationship to Other Professions

Educational technology does not operate in a vacuum. First, it operates within society as a whole, and, as such, is faced with all of the questions a society must deal with—racism, sexism, humanism, censorship, etc. Second, it operates within the field of education along with other fields and professions and, as such, must develop some sort of relationships with these other participants. If it is to be a true profession, educational technology cannot bury its head and pretend these issues do not exist. It must deal with and take position on them.

## SOCIETY AS A WHOLE

> I submit that it is our job to be concerned about the content and philosophy of the materials we use in the future. I agree with the anthropologist, Redfield, who, in recently discussing the scientific method [i.e., objectivity and neutrality] with his colleagues, said, "Just who are you neutral for?" And he answered this question, "I have placed myself squarely on the side of [hu]mankind, and I wish [hu]mankind well" (Redfield, 1953, p. 141). [Finn, 1955, p. 252]

This bold statement raises two questions about the operation of educational technology in the context of society as a whole. First, is educational technology concerned or neutral about the ends to which its methods are put? Second, if it is concerned, what ends ought it advocate?

*Concerned Profession.* Educational technology is a means to an end—the end being the facilitation of human learning. But:

> Technology often tends to make the real goals or ends disappear, to be replaced by the means of technology as ends. An important question is derived from this assumption: Should a person (or field) concerned with the means of education also be concerned with the ends to which the means are put? (AECT, 1972, p. 42)

One answer to this question is that educational technology, and the educational technologist, should function as a "neutral technician," described, but not advocated, by Lerner (1957, p. 236):

> . . . in the sense of his disassociation from passion, commitment, or value other than his own skill in execution . . . . They have concentrated on the fact of their skills rather than on the uses to which their skills are put . . . . "What is the job you want done," asks the technician, "and I'll do it."

For example,

> Scientists who are currently working on genetic selection and manipulation simply because "the discovery of DNA makes it possible" are neutral technicians; they have not taken into account either the positive or the negative effects on society of these discoveries. (AECT, 1972, p. 42)

The other answer to the question is that educational technology should function as a concerned profession and the educational technologist as a concerned professional. This position is explained and advocated by Finn (see above) and AECT (1972):

> The opposite of the neutral technician is what we might call the *concerned professional.* This person realizes that the means make the ends possible or impossible. The concerned professional has a point of view about the ends and then decides whether or not the work being done will make possible a positive or negative end. If it is decided the work will bring about negative ends, the concerned professional refuses to perform it. (p. 42)

In contrast to the neutrality described above:

> . . . scientist[s] working on genetic selection and manipulation because, "it can help eliminate disease from the human race," and those who have quit working on it because, "it will lead to totalitarian domination by a master race," are examples of concerned professionals. Regardless of their position, they have considered the ends of their work and made a decision to work or not based on how they viewed those ends. (p. 42)

The AECT statement makes it clear that it is not the position taken, but rather the asking of the question, that makes for a concerned profession:

> It should be clear that the concerned professional does not have to be a "liberal" or a "conservative." The concerned professional *must*, however, *show moral sensitivity* to the effects of what he/she does. It does not matter what position the individual comes to, as long as it is not, "I'll do it because it can be done."
>
> We believe that in the American society of the 1970s and beyond, the educational technologist cannot afford to be a neutral technician. The field calls for concerned professionals. Some very hard questions must be raised about everything this person is called on to do.
>
> The concerned professional must ask how the resources produced or used affect all of society, as well as the scientist's own life. The concerned specialist must ask what to do if he/she disagrees with the messages of resources.
>
> It is less important how an educational technologist answers these questions than it is that they are asked, and that there is concern with the real end of the means. (p. 42)

*Ends Advocated.* Some, however, believe that the concerned profession must go beyond the asking of questions, and formulate value positions for the professi[illegible] They believe that educational technologists:

> . . . have as their first order of business the serious, searching examination and necessary reordering of the values they act out in their role . . . . (Hoban, 1968, p. 6)

The problem is posed by the fact that since they are so powerful, the technique and application of educational technology "can be used in the future to pervert knowledge and information to immoral ends." (Finn, 1955, p. 250)

To combat this possibility, various ends have already been advocated by AECT and by writers in the field of educational technology. These value positions are in the areas of intellectual freedom, affirmative action, stereotyping, and the humane application of technology.

*Intellectual Freedom.* AECT has taken a strong position in favor of intellectual freedom. Its Code of Ethics states that its members "shall protect the individual's rights of access to materials of varying points of view" (AECT, 1976).

President Gilkey made this commitment stronger in his presidential inaugural address:

> We must become concerned about censorship. We must develop guidelines to enable our membership to deal with all types of censorship. We must oppose the censorship of both liberal and conservative groups which attempt to eliminate materials that may offend them. We must take the position that students need information on all sides of the issue if they are to make intelligent decisions. (Gilkey, 1976, p. 10)

*Affirmative Action.* AECT has also taken a position in favor of affirmative action. It has an affirmative action committee which is "working on a plan to involve women and ethnic minorities in the activities of AECT and the field generally" (Hill, 1976, p. 14). Further, "the efforts of this committee are an indication of the active stance we must take . . . " (p. 14), and it "should receive the support, attention and cooperation of each member." (Gilkey, 1976, p. 11)

*Stereotyping.* AECT has taken a strong position *against* stereotyping in materials. The AECT Code of Ethics states that AECT members:

> Shall in the design and selection of any educational program or media seek to avoid content that reinforces or promotes sexual, ethnic, racial, or religious stereotypes. Shall seek to encourage the development of programs and media that emphasize the diversity of our society as a multi-cultural community. (AECT, 1976)

This position was reinforced by President Gilkey in his presidential inaugural address (Gilkey, 1976, p. 11).

Further, Hoban (1970) argues that we must dispel the myths created by the Coleman and Jenkins studies that some classes of

students (especially blacks) are intellectually inferior due to genetics or family upbringing. He argues that we must, through educational technology, create truly universal and effective education for all people.

*Humane Application of Technology.* AECT recognizes that although technology is a means, it has effects. Additionally, there is disagreement whether these effects are positive or negative. If we are to use educational technology, then, AECT believes that:

> . . . it must be shown that technology can be enlisted in the support of humane and life-fulfilling ends. It must be shown that educational technology makes sense in the light of the wider effects of technology on society, and that such a field can help society achieve its potential for enhancing the humanity of each individual. (AECT 1972, pp. 41-42)

Komoski (1972) believes that we can do this, and suggests how. We can, he says,

> . . . maintain a socially relevant human centered existence in the midst of a technological society by persuasively demanding that the traditional technological system be adapted to serve the human and material needs of all members of society. (p. 5)

Silber (1972) is more specific in identifying the elements that must be present if technology is to be used for humane ends. He does this in terms of the relationship between what he calls "true freedom" and "true technology." He defines freedom as including "the *right* to choose, the *ability* to choose, the *options* available from which to choose" (p. 29). This freedom is expressed in a true technology when:

> 1) the needs [it addresses] come originally from the initiator/recipient [learner];
>
> 2) the needs are expressed and heard;
>
> 3) the products meet the needs;
>
> 4) people control the processes and devices throughout and use them to serve the needs . . . . (p. 31)

He concludes that:

> True freedom is impossible without technology;
>
> True technology is impossible without freedom. (p. 33)

## RELATIONSHIP TO OTHER PROFESSIONS

We have already indicated the broad, integrative nature of the theoretical construct of educational technology. Clearly, there are many different groups of people who perform activities within educational technology, all of whom do not belong to the profession of educational technology.

How does the person who is in the profession of educational technology relate to these other people—to these people who consider their professions as other than educational technology?

Educational technology operates in the context of the larger educational enterprise, and therefore in the context of the other professions and people who are also involved in the facilitation of human learning. The educational technologist is not the only person making decisions about the facilitation of learning through the identification, development, organization, and utilization of learning resources. The teacher, curriculum specialist, administrator, content specialist, librarian, and the student are involved in the process too.

It is, therefore, important for the field of educational technology to recognize the "other people" context in which it operates. Further, it is essential to ascertain *what the relationship of the profession of educational technology with these other professions will be.*

In a practical sense, the work relationship means, "Who will get to make the ultimate decisions about facilitating learning and how it is done?" There are four possible decision-making relationships between educational technology and the other professions: 1) Educational technology works in a subordinate decision-making role to the other professions with very little authority or responsibility for instructional decision-making. 2) Educational technology works in a superordinate decision-making role to the other professions and assumes a key role in instructional decision-making. 3) Educational technology, and its purposes and means, gradually become adopted as the purposes and means of the other professions, thus eliminating the decision-making problem. 4) Educational technology participates in a co-equal decision-making role with the other professions, deciding together which field will make ultimate decisions as a function of the special requirements of the situation and institution.

Of the four alternatives, co-equal relationship appears to be most promising and is built upon two important principles: the trust of the profession by others, and the recognition of honest differences

> between professions which can be reconciled. If the various professions involved in education can begin to function in this way, then the co-equal relationship has the potential for strengthening the facilitation of learning. (AECT, 1972, p. 42)

The 1976 AECT convention theme also stressed the relationship to other professions—that of a cooperative and interdependent one.

> We have reached the point where interdependence is more than a word. It is a way of life. (Hill, 1976, p. 15)

> Let's make the year ahead one in which we listen to our fellow educators and the general public . . . . In doing so we take a *risk*, a risk of losing our independence, and maybe our security. But we *may gain in this interdependence far more than we would in protecting our achievements behind moated walls.* (Gilkey, 1976, p. 11; italics added.)

## SUMMARY

Educational technology operates within the larger context of society and within the field of education. In its societal role, educational technology advocates being a concerned profession—concerned about the uses to which its techniques and applications are being put. Further, as a profession, it has taken stands in favor of intellectual freedom, in favor of affirmative action, against stereotyping in materials, and in favor of enlisting technology in the support of humane and life-fulfilling ends. In its relationship to other professions involved in education, educational technology advocates a cooperative, interdependent, and co-equal relationship among all the professions involved.

# CHAPTER X

# Educational Technology as a Theory, a Field, and a Profession: An Evaluation

The definition statement has presented an historical perspective of attempts to define educational technology and a current theoretical framework for defining educational technology. It has also identified the intellectual technique and practical applications derived from the theoretical framework and it has described the training and certification, the ethics and standards, the leadership, the association and communications, the acknowledgement as a profession, the concern of the profession, and the relationship to other professions that both derive from the theoretical framework and exist in educational technology today.

It is now appropriate to evaluate the definition statement, in terms of the criteria set forth in Chapter II, to determine if it is adequate to define educational technology as a theory, as a field, and as a profession, and to determine if the three, as defined, are congruent.

## EDUCATIONAL TECHNOLOGY AS A THEORY

The statement has defined educational technology as a complex integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems, and devising, implementing, evaluating, and managing solutions to those problems, involved in all aspects of human learning. It has further identified the elements of educational technology and their interrelationships in the Domain of Instructional Technology model. It has shown how educational technology is different from technology in education and from instructional technology. Finally, it has shown how the current definition is derived from previous attempts to conceptualize and define educational technology.

Does the definition as stated constitute a theory? To answer this question, we can compare it against the criteria for a theory (see Chapter II).

*Existence of a Phenomenon.* There is definitely a phenomenon which is not completely understood in terms of current theories, *i.e.*, how problems in human learning are identified and solved.

*Explanation.* The definition explains how problems are identified and solved. The explanation consists of the resources that make up the solutions to the problems, the functions which are used to analyze problems and derive solutions, the complex, integrated process of looking at whole problems and systematically combining individual technologies to solve them, and the effects of applying the solutions so derived in the real world.

*Summarizing.* The definition summarizes, and includes, most of the concepts and empirical relationships that have been identified or derived since interest in this phenomenon began (see Chapter III).

*Orientation.* The definition clearly identifies what is relevant to the phenomenon and what is not. It makes clear that the Learning Resources, the Educational/Development and Management functions as they are applied to the resources, and the complex, integrated technological approach are the only elements relevant to the phenomenon.

*Systematizing.* The Domain of Educational Technology clearly provides a scheme by which relevant phenomena, concepts, and postulates are systematized, classified, and interrelated.

*Gap Identification.* The definition and model clearly point out areas (in terms of resources, functions, and complex, integrated process). From these areas, it is possible to survey past research and identify which areas have not been resolved at present. While there are some areas yet to be resolved regarding the resources and functions, the major gap identified by the definition is the study of the complex, integrated process operating as a totality, and the effects they will have.

*Generating Strategies for Research.* The definition generates enough research hypotheses to keep people performing the Research-Theory Function for years to come. It generates hypotheses related to: the most effective and efficient methods for performing each of the Educational Development and Management functions; the most effective methods for combining the individual technologies of the functions into the complex, integrated process; testing each of the hypothesized effects of introducing educational technology into educational organizations; the most effective and efficient methods of training and then certifying people as being competent in educational technology; the most useful set of certification areas; the most effective structure, goals, and functions of the professional association; the adequacy of the ethics and standards; the effects of being a concerned profession; the adequacy of and effects of each of the value positions taken by educational technology; and the most effective relationships between educational technology and the other related professions.

*Prediction.* The definition predicts what will happen when educational technology is applied to identify and solve problems in human learning. The predictions take the form of identifying alternative decision making, instructional, and institutional patterns of education.

*A Principle or Set of Principles.* The definition of educational technology consists of a set of principles, a set of general statements, which included all of the above elements (see Chapter I for a complete set of the principles).

### Educational Technology as Theory

Since the definition presented here meets all nine criteria for a theory, *educational technology, as defined here, is a theory* about how problems in human learning are identified and solved.

## EDUCATIONAL TECHNOLOGY AS A FIELD

Since the definition meets the criterion of theory and research, it meets the first criterion for defining a field. In addition, it must meet two additional criteria: unique intellectual technique and practical application.

*Unique Intellectual Technique.* Educational technology has an approach to solving problems. Each development and management function has an individual technique associated with it. However, the intellectual technique of educational technology is more than the sum of these parts. It involves the systematic integration of the individual technologies of these functions, and their interrelationships, into a complex, integrated process to analyze whole problems and create new solutions. It produces a synergistic effect, yielding outcomes not predictable based on the individual elements operating in isolation. This indigenous intellectual technique is unique to educational technology. No other existing field uses it.

*Practical Application.* Educational technology has practical applications. The existence of Learning Resources and the performance of the Educational/Instructional Development and Management Functions constitute the most basic and explicit evidence of this practical application. In addition, the application of educational technology affects the organizational structure of education:

it moves the impact of educational technology to the curriculum strategy (and perhaps determination) level;

it permits four types of educational patterns—people resources alone, other resources going through people, people in shared responsibility with other resources (combined into educational systems using "mediated instruction,"), other resources ("mediated instruction") alone;

it makes possible the existence of alternative institutional forms for facilitating learning, and can serve all these types of alternative institutions.

These applications have significant impact on the specific processes of education. They change the techniques of doing, and the people who do, content determination (including standardization, choice, quantity, and quality), design, production, and evaluation of instruction, and interaction with, and assessment of, learners. The result is a drastic change in the role of school systems and the individual teacher.

### Educational Technology as a Field

Since the definition presented here meets all three criteria for the existence of a field, *educational technology, as defined here, is a field* involved in applying a complex, integrated process to analyze and solve problems in human learning.

## EDUCATIONAL TECHNOLOGY AS A PROFESSION

Since the definition meets the criteria of theory and research, unique intellectual technique, and practical application, it meets the first three criteria for defining a profession. In addition, it must meet seven other criteria.

*Training and Certification.* There is a competency-based framework for training people who perform tasks in educational technology. The framework is based on grouping of tasks from various functions within the Domains of Educational and Instructional Technology. The groupings reflect specialties within the field as well as levels of performance within the specialty area. The specialties are instructional program development, media product development, and media management. The three levels of task complexity are aide, technician, and specialist. AECT currently has guidelines for training programs for, and certification of, technicians and specialists in each of the three specialty areas, and is developing procedures for the implementation of those guidelines.

*Standards and Ethics.* There are standards for school media programs (K-12), for cataloguing nonprint materials, for

learning resources programs in two-year colleges, for media training in teacher education programs and advanced programs in educational media. There is a code of ethics for educational technologists.

*Leadership.* Leadership within the profession is carried out through various leadership conferences and internship programs. In addition, educational technology fulfills a leadership function in the field of education through participation in joint groups, grants, and publications.

*Association and Communications.* There is at least one professional association directly concerned with educational technology—the Association for Educational Communications and Technology. In addition to facilitating communication among members through its annual convention and three journals, it serves to develop and implement the standards and ethics, leadership, and training and certification characteristics of the profession.

*Acknowledgement as a Profession.* Educational technology acknowledges itself as a profession through its professional association and the activities it performs.

*Concerned Profession.* Educational technology operates within the larger context of society. It advocates being a concerned profession—concerned about the ends for its techniques and applications. Further, as a profession, it has taken stands in favor of intellectual freedom, in favor of affirmative action, against stereotyping in materials, and in favor of enlisting technology in support of humane and life-fulfilling ends.

*Relationship to Other Professions.* Educational technology operates within the total field of education. It advocates a co-equal and cooperative relationship with other educational professions.

**Educational Technology as a Profession.**

Since the definition presented here meets all the criteria for the existence of a profession, *educational technology, as defined here, is a profession,* made up of an organized effort to implement the theory, intellectual technique, and practical application of educational technology.

### Congruence of the Theory, Field, and Profession

The definition presented here defines the theory, the field, and profession as congruent. This occurs because the definition of the field of educational technology is directly derived from, and includes, the theory of educational technology, and the profession of educational technology is directly derived from, and includes, the field of educational technology.

## EDUCATIONAL TECHNOLOGY SUMMARY

Educational technology is a *theory* about how problems in human learning are identified and solved.

Educational technology is a *field* involved in applying a complex, integrated process to analyze and solve problems in human learning.

Educational technology is a *profession* made up of an organized effort to implement the theory, intellectual technique, and practical application of educational technology.

The definitions of educational technology as a theory, a field and a profession are congruent—with each being derived directly from the one which precedes it.

## PEOPLE IN THE FIELD OF EDUCATIONAL TECHNOLOGY

Thus far we have looked at the field of educational technology in terms of its activities and effects. However, we indicated earlier that, as a field, educational technology is looked at more frequently in terms of jobs and activities performed by real people in the real world. Now we must address the question of who these people are, or "Who is in the field of educational technology?"

*Anyone who performs one of the tasks or activities of one of the functions of educational technology in relation to learning resources, in terms of the theory, employing the intellectual technique, in in the field of educational technology.*

If a person systematically designs materials in the context of solving problems in human learning, then s/he is in the field because s/he is operating within the theory of educational technology, because s/he is using the intellectual technique of educational technology, and because s/he is applying educational

technology—*i.e.*, performing tasks and activities in educational technology. The same is true for a person who catalogues materials and a person who manages a learning resources center in the context of solving problems in human learning.

Since membership in the field of educational technology is based on performance, it may be considered to be *involuntary*. Even those who are not traditionally considered to be "educational technologists" are operating in the field if they meet the criteria given above. A teacher is operating in the field of educational technology when s/he utilizes materials to help children learn, and an architect is operating in the field when s/he designs settings *(e.g.*, school buildings, resource centers), if they are operating in terms of the theory, and employing the intellectual technique, of educational technology.

Membership in the field of educational technology may not be a constant state for many people. The architect is considered to be operating in the field only when s/he designs settings to facilitate learning. When s/he designs houses or apartment buildings not used to facilitate learning, then s/he is not operating within the field. There are, of course, many people whose activities place them in the field of educational technology all the time. All the activities they perform fall within the Domain of Educational Technology are based on the theory, and employ the intellectual technique.

To summarize, membership in the field of educational technology is determined not by title or by job, but rather by the activities one is performing at a specific time, the theoretical framework on which the activities are based, and the intellectual technique underlying the application. If these activities fall within the Domain of Educational Technology, then the person is operating within the field of educational technology.

## PEOPLE IN THE PROFESSION OF EDUCATIONAL TECHNOLOGY

Thus far we have looked at the profession of educational technology in terms of the criteria the total profession must meet. However, we indicated earlier that, as a profession, educational technology is looked at by people as a title they can call themselves ("educational technologist") and as a "professional

home." Now we must address the question of who these people are who call themselves "educational technologists," or "Who is in the profession of educational technology?"

First, we can clearly state that everyone who operates within the field is not a member of the profession. To be in the profession, one must meet criteria beyond the performance of the Domain of Educational Technology activities, employing the theoretical framework and intellectual technique of educational technology.

However, in order to be a member of the profession, one must operate within the field. Thus, being in the field is only one necessary condition for membership in the profession. An additional criteria required was clearly set forth by Finn:

> By . . . [educational technology] personnel is meant, for the moment, those individuals who spend fifty percent or more of their time working with [educational technology] programs in schools and colleges [and business or industry] as directors, supervisors, producers, consultants, etc. or those who engage in in-service teacher training or research in this area. (Finn, 1953, p.8)

Thus, one criterion for membership in the profession is that a person spend a majority of his/her time performing one or more of the Domain of Educational Technology functions related to the learning resources.

The other additional criteria for belonging to the profession are derived by *applying the characteristics of a profession to individuals.* That is, just as a profession must meet these characteristics to be considered a profession, so must a person meet these same characteristics on a personal level to be considered as a member of the profession. Specifically, then, in order to be a member of the profession, a person must:

subscribe to the standards and ethics of the profession;

have the training and certification required by the profession;

be involved in developing one's leadership ability;

be a member of the association and participate in its communications through reading its journals and attending its meetings;

acknowledge oneself as a member of the educational technology profession, and not some other profession;

be a concerned professional, examining the ends to which one's skills are put and accepting those values set forth by the profession;

relate to other professionals on a co-equal and cooperative basis.

A person who is in the field of educational technology, who spends a majority of his/her time performing one or more of the Domain of Educational Technology functions, and who meets the seven other criteria of a professional can be considered to be a member of the profession of educational technology, and call him/herself an "educational technologist."

## EDUCATIONAL TECHNOLOGIST SUMMARY

A person is a member of the *field* of educational technology if s/he performs activities that fall within the Domain of Educational Technology, based on the theoretical framework of, and employing the intellectual technique of, educational technology.

A person is a member of the *profession* of educational technology if s/he already meets the criteria for operating within the field, spends a majority of his/her time performing one or more of the Domain of Educational Technology functions, subscribes to the standards and ethics of the profession, has the training and certification required by the profession, is involved in developing his/her own leadership ability, is a member of the association and participates in its communications through reading its journals and attending its meetings, acknowledges him/herself as a member of the profession, and is a concerned professional—examining the ends to which his/her skills are put and accepting those values set forth by the profession, and relating to other professionals on a co-equal and cooperative basis. This person may be called an "educational technologist."

## CONCLUSION

The definition of educational technology presented here is new.

While it grows out of and uses concepts from previous theoretical frameworks of educational technology, it is, in Lewis' (Hawkridge, 1976) words, "a whole new conceptual frame-

work." It is a synthesis which presents a new way of thinking about what the concept, field, and profession of educational technology are.

Lewis indicates that this type of new conceptual framework is a "lonely and high risk activity." Kuhn (1962) would consider this new framework a major paradigm change for educational technology and predict the difficulties which will occur in its acceptance by educational technologists and non-educational technologists alike.

To present the other side of these views of the difficulties associated with this new conceptual framework, we close the Definition of Educational Technology with two positive statements that best summarize what this new definition means and what its implications can be:

> Properly constructed, the concept of instructional or educational technology is totally integrative. It provides a common ground for all professionals, no matter in what aspect of the field they are working: it permits the rational development and integration of new devices, materials, and methods as they come along. The concept is so completely viable that it will not only provide new status for our group, but will, for the first time, threaten the status of others. (Finn, 1965, p. 193)

> The educational future will belong to those who can grasp the significance of [educational and] instructional technology. (Finn, 1964, p. 26)

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# Appendix-Theory

Development Function

PURPOSE: to generate knowledge (theory and research methodology) related to the functions, Learning Resources and Instructional System Components, and learners.

OUTCOME: knowledge which can act as an input to the other functions.

ACTIVITY: seeking information, reading it, analyzing it, synthesizing it, testing it, analyzing test results.

The terms in the Theory Function are those which serve as the general underpinnings for all the other Functions. They are the terms used to describe the field, or portions of it, the people who work in it, the jobs and tasks they perform, and the products they produce. The Theory Function is divided into three parts:

**Definition of the field** includes the terms used in this book. Definitions of the terms are given in alphabetical sequence. For a complete overview of the terms, examples of them, and their interrelationships, see Chapter I, "The Definition of Educational Technology: A Summary."

**Theoretical concepts from the field** includes those terms which either are historical (or other) names for the field of educational technology or are common terms to describe the

general processes and products of the field.

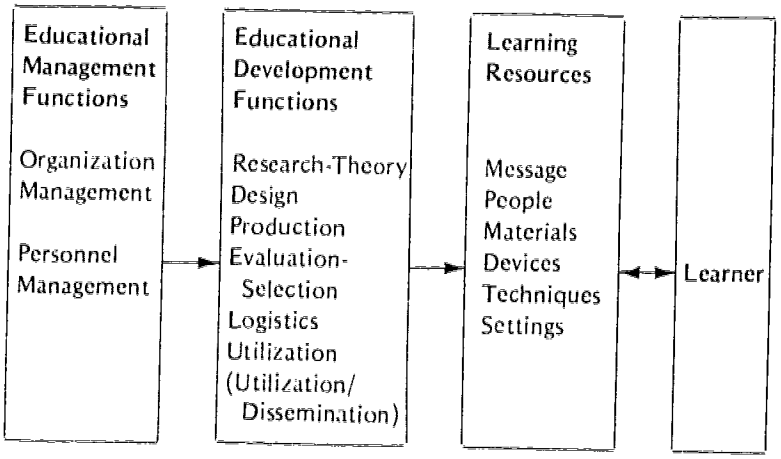
**People/jobs/places in the field** includes those terms which describe titles, jobs, tasks, and places of employment of people in the field and profession of educational technology.

## DEFINITION OF THE FIELD

**Design.** An Educational/Instructional Development Function. *Purpose*—to translate general theoretical knowledge into specifications for Learning Resources/Instructional System Components; *outcome*—specifications for production of Learning Resources/Instructional System Components, regardless of format or resource; *activity*—analyzing synthesizing, and writing objectives, learner characteristics, task analyses, learning conditions, instructional events, specifications for Learning Resources/Instructional System Components. (Hyer *et al.*)

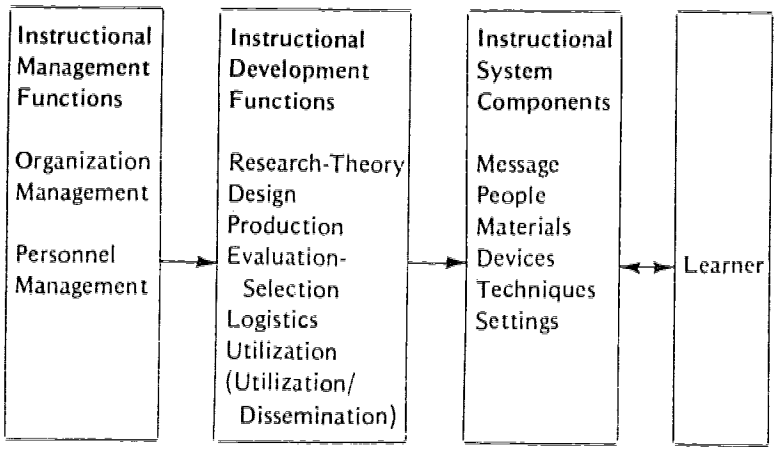
**Device.** A Learning Resource/Instructional System Component. Items (traditionally called hardware) which transmit Messages stored on Materials. (Hyer *et al.*)

**Domain of Educational Technology.** A model which shows the elements and interrelationships of instructional technology. (D & T Committee):




DOMAIN OF EDUCATIONAL TECHNOLOGY

**Domain of Instructional Technology.** A model which shows the elements and interrelationships of instructional technology. (D & T Committee):




DOMAIN OF INSTRUCTIONAL TECHNOLOGY

**education.** The aggregate of all the processes by means of which a person develops abilities, attitudes, and other forms of positive behavior of positive value in the society in which s/he lives. (Good)

**Educational Development Functions.** Functions which have as their purpose analyzing problems, and devising, implementing, and evaluating the Learning Resources solutions to these problems. (D & T Committee)

**Educational Management Functions.** Functions which have as their purpose the directing or controlling one or more of the Educational/Instructional Development Functions or of other Educational/Instructional Management Functions to ensure their effective operation. (D & T Committee)

**educational technology.** 1. *Educational technology* is a complex, integrated process involving people, procedures, ideas, devices and organization, for analyzing problems, and devising, implementing, evaluating and managing solutions to those problems, involved in all aspects of human learning. In

educational technology, the solutions to problems take the form of all the *Learning Resources* that are designed and/or selected and/or utilized to bring about learning; they are identified as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems, and devising, implementing and evaluating these solutions are identified by the *Educational Development Functions* of Research-Theory, Design, Production, Evaluation-Selection, Logistics, and Utilization. The processes of directing or coordinating one or more of these functions are identified by the *Educational Management Functions* of Organization Management and Personnel Management. The relationships among these elements are shown by the Domain of Educational Technology Model. Educational technology is often confused with "technology in education" and "instructional technology." (D & T Committee)

**Evaluation-Selection.** An Educational/Instructional Development Function. *Purpose*—to assess acceptability of actual produced Learning Resources/Instructional System Components in terms of criteria set by other functions, and to develop models for this assessment; *outcomes*—Evaluation for Design, effectiveness of Learning Resources/Instructional System Components in meeting objectives; Evaluation for Production, acceptability of Learning Resources/Instructional System Components in meeting production standards; Evaluation for Evaluation, evaluation models; Evaluation for Selection, acceptability of items for acquisition for a specific purpose; Evaluation for Utilization, acceptability of Learning Resources/Instructional System Components for meeting learner objectives; *activity*—analyzing quality in terms of standards. (Hyer *et al.)*

**function.** A unique cluster of tasks which have a common or unique set of activities, outcomes, or purposes in the educational/instructional management/development process. (Hyer *et al.)*

**instruction.** The process whereby the environment of an individual is deliberately managed to enable him/her to learn to

emit or engage in specified behaviors under specified conditions or as responses to specified situations; a specific subset of education. (Corey)

**Instructional Development Functions.** Functions which have as their purpose analyzing problems, and devising, implementing, and evaluating the Learning Resource/Instructional System Component solutions to these problems. (D & T Committee)

**Instructional Management Functions.** Functions which have as their purpose the directing or controlling one or more of the Development Functions or of other Management Functions to ensure their effective operation. (D & T Committee)

**Instructional System Components.** (for instructional technology) The subset of Learning Resources which are prestructured in design or selection, *and* utilization, and which are combined into complete instructional systems, to bring about purposive and controlled learning. (D & T Committee)

**ISC.** An abbreviation for Instructional System Component. (D & T Committee)

**instructional technology.** A sub-set of educational technology, based on the concept that instruction is a sub-set of education. Instructional technology is a complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems and devising, implementing, evaluating and managing solutions to those problems, in situations in which *learning is purposive and controlled.* In instructional technology, the solutions to problems take the form of *Instructional System Components* which are prestructured in design or selection, *and* in utilization, and combined into complete instructional systems; these components are identified as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems and devising, implementing, and evaluating these solutions are identified by the *Instructional Development Functions* of Research-Theory, Design, Production, Evaluation-Selection, and Utilization. The processes of directing or coordinating one or more of these functions are

identified by the *Instructional Management Functions* of Organization Management and Personnel Management. The relationships among these elements are shown by the Domain of Instructional Technology model. Thus, instructional technology fits within the parameters of educational technology, while educational technology does not fit within the parameters of instructional technology. If instructional technology is in operation, then of necessity, so is educational technology; the reverse is not necessarily true. In educational technology, the Development and Management Functions are more inclusive because they apply to more Learning Resources than just Instructional System Components—they include all resources that can be used to facilitate learning. (D & T Committee)

**Learning Resources.** (for Educational Technology) All of the resources (data, people, and things) which may be used by the learner in isolation or in combination, usually in an informal manner, to facilitate learning; Learning Resources include Messages, People, Materials, Devices, Techniques, and Settings. There are two types: (a) resources by design—those resources which have been specifically developed as Instructional System Components in order to facilitate purposive, formal learning, and (b) resources by utilization—those resources which have not specifically been designed for instruction but which can be discovered, applied, and used for learning purposes. (D & T Committee)

**Logistics.** An Educational/Instructional Development Function. *Purpose*—to make Learning Resources/Instructional System Components available for other functions; *outcome*—ordered, stored, retrieved, classified, catalogued, assembled, scheduled, distributed, operated, maintained, and repaired Learning Resources/Instructional System Components; *activity*—ordering, storing, retrieving, classifying, cataloging, assembling, scheduling, distributing, operating, maintaining, repairing Learning Resources/Instructional System Components. (Hyer *et al.*)

**LR.** An abbreviation for learning resources. (D & T Committee)

**Material.** A Learning Resource/Instructional System Component. Items (traditionally called software) which store messages for transmission by devices; sometimes self-displaying. (Hyer *et al.)*

**Message.** A Learning Resource/Instructional System Component. Information to be transmitted by the other components; takes the form of ideas, facts, meanings, data.

**model.** (theory) A conceptualization in the form of an equation, a physical device, a narrative, or a graphic analog representing a real-life situation either as it is or as it should be. It is not the original situation but a replica of it; the more faithful the replica, the better the model. There are two types: models of explanation; models for—prescription. (Silvern, Heinich)

**Organization Management.** An Educational/Instructional Management Function. *Purpose*—to determine, modify, or execute the objectives, philosophy, policy, structure, budget, internal and external relationships and administrative procedures of an organization performing one or several of the Development Functions or the Management Functions; *outcome*—policy, budget, plans, coordinated activities, administrative operations; *activity*—defining, writing, and carrying out procedures leading to the outcomes. (Hyer *et al.)*

**People.** A Learning Resource/Instructional System Component. Persons who are acting to store and/or transmit Messages. (Hyer *et al.)*

**Personnel Management.** An Educational/Instructional Management Function. *Purpose*—to interact with and/or to supervise the people who perform activities in the functions; *outcome*—interpersonal interaction, discussion, supervision, employment, and personal development; *activity*—discussing with and speaking to other people. (Hyer *et al.)*

**Production.** An Educational/Instructional Development Function. *Purpose*—to translate specifications for Learning Resources/Instructional System Components into specific, actual items; *outcome*—specific products in the form of test versions, prototypes, or mass-produced versions; *activity*

—operating production equipment, drawing, laying out, writing, building products. (Hyer *et al.)*

**Research-Theory.** An Educational/Instructional Development Function. *Purpose*—to generate and test knowledge (theory and research methodology) related to the Management and Development Functions, Learning Resources/Instructional System Components and Learners; *outcome*—knowledge which can act as an input to the other functions; *activity* —seeking information, reading it, analyzing it, synthesizing it, testing it, analyzing test results. (Hyer *et al.)*

**Setting.** A Learning Resource/Instructional System Component. The environment in which the Messages are received. (Hyer *et al.)*

**task.** An activity which is an observable and/or measurable unit of work done by a person or machine, and which has a direct or immediate outcome, and which, with other tasks, contributes directly to the accomplishment of a goal or purpose. (Hyer *et al.)*

**Technique.** A Learning Resource/Instructional System Component. Routine procedures or pre-cast molds for using Materials, Devices, Settings and People to transmit Messages. (Hyer *et al.)*

**technology.** 1. The systematic application of scientific or other organized knowledge to practical tasks. (Galbraith). 2. A complex, integrated process for analyzing problems, and of devising, implementing, managing and controlling and evaluating solutions to those problems. (D & T Committee) 3. Technology is not just machines and men. It is a complex, integrated organization of men and machines, of ideas, of procedures, and of management. (Hoban) 4. Technology includes processes, systems, management and control mechanisms both human and non-human, and above all a way of looking at problems as to their interest, and difficulty, the feasibility of technical solutions, and the economic values—broadly considered—of those solutions. (Finn)

**technology in education.** The application of technology to any of those processes involved in operating the institutions

which house the educational enterprise. It includes the application of technology to food, health, finance, scheduling, grade reporting, and other processes which support education within institutions. Technology in education is *not* the same as educational technology.(D & T Committee)

Utilization. An Educational/Instructional Development Function. *Purpose*—to bring learners into contact with Learning Resources/Instructional System Components; *outcome*—facilitation and assessment of student learning; *activity*—assigning, preparing learner for, presenting, assisting, and following up Learning Resources/Instructional System Components; testing learners. (Hyer *et al.)*

Utilization/Dissemination. An Educational/Instructional Development Function (a special subfunction of Utilization). *Purpose*—to bring learners into contact with information about educational technology; *outcome*—dissemination of information about educational technology; *activity*—taking in and giving out information about educational technology. (Hyer *et al.)*

## THEORETICAL CONCEPTS FROM THE FIELD

audiovisual communications. 1. The transmission of information by visual and/or audio displays. (Heinich) 2. (historical) That branch of educational theory and practice concerned primarily with the design and use of messages which control the learning process. It undertakes: (a) the study of the unique and relative strengths and weaknesses of both pictorial and non-representational messages which may be employed in the learning process for any purpose; and (b) the structuring and systematizing of messages by men and instruments in an educational environment. (This process includes the planning, production, selection, management, and utilization of both components and entire instructional systems.) Its practical goal is the efficient utilization of every method and medium of communication which can contribute toward developing the full potential of the learner. (DAVI, 1963) (See *educational technology.)*

**audiovisual instruction.** 1. A sub-field of instructional technology concerned with the Production and Utilization of those Materials (and related Devices) which are used in formal instruction and which involve learning through sight and/or hearing. (Heinich) 2. (historical) Instructional materials and methods which do not depend exclusively upon comprehension of words or similar symbols. (Brown and VanderMeer) 3. That field of human expression that employs visual and auditory aids to learning, including motion pictures, television, sound and silent filmstrips, slide sets, recordings, transparancies, projected opaque picture, and a variety of graphic arts. (DAVI, 1963) 4. The (second) name of AECT's (then DAVI) official journal. (D & T Committee)

**audiovisual materials.** A collective noun (not the name of a field), referring to a collection of materials and devices which are displayed by visual projection and/or sound reproduction; sometimes used (albeit incorrectly) to designate a field of study. (Heinich) (See *Educational Technology.)*

**educational communications.** A regional name for the field. (D & T Committee) (See *Educational Technology.)*

**educational media.** 1. The media born of the communications revolution which can be used for instructional purposes alongside the teacher, textbook, and blackboard. (Presidents Commission) (See *Educational Technology.* See also *Materials, Devices, Techniques, Settings.)* 2. An historical name for field. (D & T Committee) (See *Educational Technology.)*

**individualized instruction.** 1. A type of instruction which should include, as appropriate, six basic and equally important elements: (a) flexible time frames, (b) diagnosis, remediation and exemption, (c) content options, (d) student evaluation—alternate forms and flexible times, (e) a choice of locations, and (f) alternate forms of instruction. (Diamond) 2. A type of instruction that is a function of the frequency with which the decision to change the instructional presentation is made as a result of the assessment of an individual student's achievements, needs or aspirations. Individualization constitutes a continuum, based upon the frequency at which decisions to assess repertoire and modify presentations

are undertaken. Since individualization is a continuum, all we can say is that one program is more individualized than another. A continuum to measure the degree of individualization is based on a model which "compares school versus pupil selection of learning objectives (what is to be learned), and school versus pupil selection of media for achieving the (how the objectives are to be reached). (Tosti and Harmon; Hull based on Ed.ing) (*Not* synonymous with, though often confused with *self instruction, independent study, individual instruction, personalized instruction,* or *individually prescribed instruction.* See definitions of each.)

**instructional design.** The part of the instructional development process that is analogous to the Design Function of the Domain of Educational Technology model—*i.e.,* the generation of specifications for Learning Resources/Instructional System Components. (*Not* synonymous with, though often confused with, *instructional development* and *instructional product development.)*

**instructional development.** A systematic approach to the design, production, evaluation, and utilization of complete systems of instruction, including all appropriate components and a management pattern for using them; instructional development is larger than *instructional product development,* which is concerned with only isolated products, and is larger than *instructional design,* which is only one phase of instructional development. (D & T Committee) (See *instructional design, instructional product development.)*

**instructional media.** (See *Educational Media.)*

**instructional product.** A combination of Instructional System Components (including a Technique plus any one or more of the other Instructional System Components) which (a) is designed to achieve specified, but limited, objectives without additional input, (b) includes the instructional methodology, format, and sequence called for in the design, (c) is replicable and reproducible, (d) has been developed through the instructional product development process, and (e) has been validated; a sub-set of instructional system. (Heinich) (See *instructional system.)*

**instructional product development.** The part of the instructional development process concerned with the design, production and evaluation of isolated sets of instructional Materials, Devices, and Techniques. (Heinich, mod.) (See *instructional product, instructional development.)*

**instructional system.** 1. A combination of Instructional System Components (including a Technique plus any one or more of the other Instructional System Components) and a specified management pattern which is pre-structured in design or selection, and in utilization, to bring about purposive and controlled learning, and which: (a) is designed to achieve specified competencies or terminal behaviors for a total course of instruction, (b) includes the instructional methodology, format, and sequence called for in the design, (c) manages the contingencies of behavior, (d) includes a complete set of management procedures for using the system, (e) is replicable and reproducible, (f) has been developed through the complete instructional development process, and (g) has been empirically validated. (Heinich, mod.) 2. A unique combination and arrangement of elements of the instructional process designed to achieve agreed upon objectives to solve an instructional problem. The elements of the instructional process are (a) mass presentation techniques, (b) individual automated teaching, (c) human interaction, (d) individual study, and (e) creative periods. These elements would be treated as "black boxes" which could be combined in different ways to solve different instructional problems. (Finn, mod.)

**kit.** A collection of resources including more than one type of instructional System Component that are subject related and intended for use as an instructional unit; does not include sound/filmstrips, slide/audiotapes, and similar items unless they are accompanied by additional materials. (NCES X; Tillin and Quinly, mod.)

**media.** 1. All of the forms and channels used in the transmittal of information process. (AECT/AASL) 2. (in education) (See *Educational Media.)*

**mediated instruction.** An instructional product made up of a Material/Device/Technique combination designed to achieve specified objectives *without* additional input from other components, *e.g.*, live people; qualitatively, the methodology, style and format required in the instructional situation are designed into the product (Materials/Devices/Techniques), thereby establishing the learning sequence of the students; quantitatively, the product must be of significant enough length to make up a preponderance of the instructional situation (*i.e.*, a filmed course is mediated instruction, while a film selected from it is not). (Heinich) (See *instructional product.)*

**mediated teacher.** A teacher whose instructional efforts are presented to students in mediated form, vs. a classroom teacher who is physically present in the classroom. (Heinich) (See *mediated instruction.)*

**module.** 1. (module of instruction) An organized collection of learning experiences (usually in self-instructional form) assembled to achieve a specified group of related objectives; generally conceived of constituting several hours to several weeks of instruction; may be called a minicourse if credit is given. (Heinich) 2. (module of students) A group of students following the same course of instruction in a flexible scheduling system. (Good) 3. (module of time) A unit of time in a flexible scheduling system, commonly varies in length from 15 minutes to one hour. (Good) 4. (module of equipment) A group of parts performing a specific function and assembled as a unit so that replacement is by unit rather than by part. (Heinich)

**multi-image.** The use of two or more separate images (usually projected) simultaneously in the same presentation. Multi-image does *not* usually refer to two images from a single source. (Also called multimage.) (D & T Committee) (Contrast with *multimedia.)*

**multimedia.** 1. The integration of more than one medium in a complementary manner (*e.g.*, slide/audiotape) in a presentation or module of instruction. (D & T Committee) (Contrast with *multi-image.)* 2. In publishing, a term for all instruc-

tional media other than print but particularly films, filmstrips, video, transparencies, and recordings. (Heinich)

**protocol material.** A documentary record (in film video tape, sound slides, etc.) of the actual behavior of teacher and pupils in classroom and other school settings, that serves as raw data for interpretation of referent behavior using concepts basic to teacher education (*e.g.* psychological, social, pedagogical concepts); a means of conjoining concept and behavior in an interpretive act. (Heinich)

**self-instruction.** An instructional technique which involves the use, by students, of instructional materials (especially programed instructional materials, learning packages, and audio-tutorial systems) which include stimuli, provision for responses, feedback, and testing so that the students can learn either without teacher intervention or with a minimum of teacher guidance. It is often erroneously considered a synonym for individualized instruction, but in reality self-instruction individualizes only the pace of instruction. (D & T Committee)

**sub-system.** If within a referent system (the largest organizational whole under direct consideration) there are two or more discrete orderly wholes, they are sub-systems; may be components or combinations of components; a component or group of components that perform one or more operations of a more complex system. (Silvern)

**system.** 1. (system as description) The structure or organization of an orderly whole, clearly showing the interrelationships of the parts to each other and to the whole itself. (Silvern) 2. (system as process) A process which synthesizes and interrelates the components of a process within a conceptual framework, insuring continuous, orderly, and effective progress toward a stated goal. (Heinich) 3. (system as design-process) The sum total of parts working independently and working together to achieve required results or outcomes. (Kaufman) 4. (system as solution) An integrated, programed complex of instructional media, machinery and personnel whose components are structured as a single unit

with a schedule of time and sequential phasing. (DAVI, 1963) (See also *Instructional System)*

**system analysis.** The techniques of identifying components and interrelationships of a system and of identifying and studying problems in system design and functioning. (Heinich)

**system(s) approach.** 1. A process for effectively and efficiently achieving a required outcome based on documented needs; a form of logical problem-solving akin to the scientific method; a process by which needs are identified, or problems are selected, requirements for problem solution are selected from alternatives, methods, and means are obtained and implemented, results are evaluated, and required revisions to all or part of the system are made so that the needs are eliminated. (Kaumfan) 2. A self-correcting and logical methodology for decision making to be used in the design and development of man-made entities. Component strategies of this methodology include the formulation of performance objectives, the analysis of functions and components, the distribution of functions among components, the scheduling, the training and testing of the system, installation and quality control. (Banathy) 3. A complex plan or strategy which logically accounts for and relates in an orderly fashion: goals, behavior, instrumentation, and resources for the purpose of removing or reducing problems associated with the training or education of learners. (IDI) 4. A rational procedure for designing a system for attaining specific objectives. The methodology includes specification of objectives in measurable terms; restatement of objectives in terms of capabilities and constraints; development of possible approaches; selection of appropriate approaches as a result of a trade-off study, integration effectiveness of the system in attaining objectives. (AASA) 5. The analysis of complex organizational problems and the synthesis of solutions by identifying all contingencies, designing and/or deploying all requisite components, and devising management procedures that keep the system operating effectively and efficiently shifting key decision making to the earliest

stages of planning and at the highest levels of authority in the system; a way of looking at complex organizational problems that takes into account, at the earliest stages of planning, all contingencies. (Heinich)

**system synthesis.** The technique of combining components and relationships, both new and old, into a new, redesigned system that is more effective at meeting the system goals. (Heinich)

**technology of instruction.** The specific process used to design a specific type of reliable and validated instructional product/instructional system component (*e.g.*, the process used to develop programed instructional materials is a technology of instruction, often *incorrectly* used as synonymous with *instructional technology*. (Heinich) (Same as *instructional product development*. Contrast with *instructional technology* and *technology in education.)*

**visual literacy.** A group of vision competencies a human being can develop by seeing and at the same time having and integrating other sensory experiences. The development of these competencies is fundamental to normal human learning. When developed, they enable a visually literate person to discriminate and interpret the visible actions, objects, and symbols natural or man-made, that s/he encounters in his environment. Through the creative use of these competencies, s/he is able to communicate with others. Through the appreciative use of these competencies, s/he is able to comprehend and enjoy the masterworks of visual communications. (1st National Conference on Visual Literacy)

## PEOPLE/JOBS/PLACES IN THE FIELD

**aide.** A level of work in which the worker receives specific instructions for the tasks to be performed. The task may be only part of a process, other parts of which the aide cannot or does not control. An aide can be trained for a task in a relatively short period of time, since almost everything s/he

needs to know is contained in the task. An aide is not required to solve problems external to the task. If something happens which is not covered by the instructions, the aide asks for help and cannot be held responsible for solving the problem. (After Wallington *et al.)* (See also *technician* and *specialist.)*

**audiovisual coordinator.** (historical) A term being replaced by a) media manager at the building level. (See *media manager)* and b) media specialist/professional. (D & T Committee) (See *media manager, media specialist* and *media professional.)*

**director of district media program.** A media professional with appropriate certification and advanced managerial, administrative, and supervisory competencies who qualifies for an administrative or supervisory position. (AASL/AECT)

**district media program.** The media program that is conducted at the school district level through an administrative subunit. (AASL/AECT)

**generalist.** A person who is a specialist in more than one Domain of Educational Technology Function. (D & T Committee) (See *specialist.)*

**head of school media program.** A media specialist with managerial competencies who is designated as responsible for the media program at the individual school level. Qualifications vary with such factors as the size of the school, size of media staff, and type of program. (AASL/AECT)

**instructional media center.** (See *school media center.)*

**instructional program development.** An AECT certification area which attacks the broader problem of developing a complete system of instruction—whether a course, a year's curriculum, or a multi-year plan for instruction; it implies a total application of technology and mediated instruction to facilitate learning; it primarily involves the Domain of Educational Technology Functions of research-theory, design, and organization and personnel management. (AECT Certification and Accreditation Committee)

**media aide.** A member of the media staff who performs clerical and secretarial tasks and assists as needed in the acquisition, maintenance, inventory, production, distribution, and utilization of materials and equipment. (AASL/AECT)

**media management.** An AECT certification area which deals with the ongoing support services provided to the faculty for the purpose of instruction; it is principally a responding type of service and may include some aspects of selection, acquisition, storage, retrieval, distribution, utilization, and maintenance of materials and devices; it primarily involves the Domain of Educational Technology functions of logistics and organization and personnel management. (AECT Certification and Accreditation Committee)

**media product design.** An AECT certification area which concentrates on the production of specific packages of mediated instruction; it is a translation of specific instructional objectives into concrete items which facilitate learning; it primarily involves the Domain of Educational Technology Functions of design and production. (AECT Certification and Accreditation Committee)

**media professional.** Any media person, certified or not, who qualifies by training and position to make professional judgments and to delineate and maintain media programs as program components. Media professionals may include media specialists, TV or film producers, instructional developers, radio station managers whose duties and responsibilities are professional in nature. (AECT/AASL)

**media specialist.** A person with appropriate certification and broad professional preparation both in education and media with competencies to carry out a media program. The media specialist is the basic media professional in the school program. (AECT/AASL)

**media support personnel.** All persons including technicians and aides who utilize specific skills and abilities to carry out program activities as delineated by professional staff members. (AECT/AASL)

**media technician.** A member of the media staff with technical skills in such specialized areas as graphics production and display, information and materials processing, photographic production, operation and maintenance of audiovisual equipment, operation and maintenance of television equipment, and installation of systems components. (AECT/AASL)

**regional media program.** The media prog... conducted by a region. (AECT/AASL)

**school media center.** An area or system of areas in the school where a full range of information sources associated equipment, and services from the media staff are accessible to students, school personnel, and the school community. (AECT/AASL)

**school media program.** The media program for a school, conducted through an administrative subunit. (AECT/AASL)

**specialist.** A level of work in which the worker receives only general (and sometimes vague) instructions, often stated in terms of a problem or potential need. The specialist must then analyze the problem and determine the actual needs before setting goals or finding a solution. S/he is often forced to rely heavily on theory and to develop the actual procedures and tasks which will help to reach those goals. (After Wallington *et al.)* (See also *aide, technician.)*

**technician.** A level of work in which the worker receives instructions in terms of a specific output (product or service). The technician has a choice of established procedures, routines (sequences of tasks), or definite guidelines to produce the stated output. Technicians have far more freedom than aides in choosing tasks to be done and are responsible for the output only when it has been clearly specified and when the procedures for producing the output either exist or can be easily derived from existing guidelines. (After Wallington *et al.)* (See also *aide, specialist.)*