was largely supplanted by videotape which is currently being supplanted by digitized audio and video. In 1977 teachers had to contend with scheduling and showing film, including threading a 16mm projector so that the upper and lower loops provided just the right synchronization between audio and video. Today, most homes own their own video cassette recorder (VCR) and showing a film is as simple as putting the cassette tape into the VCR. Instructional resources available outside the home have multiplied dramatically. Even in the eighties, the price to purchase or rent an entertainment or educational film was high. Today, every city has dozens of corner video shops, and grocery stores offer video rentals for less than a dollar each. Laser discs are available for home use. Public libraries not only offer videos, but discs and computer software are beginning to be available there as well. Currently, the term "information superhighway" is common vocabulary and use of the Internet is mushrooming.

In 1977 Instructional Technology was an emerging field of study. Although practice flourished, theory was limited. Proliferation of instructional design models came in the 1970's and 1980's. Many models were introduced including Dick and Carey's design model (1978) and Keller's motivation model (1983). The cognitive perspective had not yet come to supersede behaviorism in instructional psychology, and performance technology had not yet become a key concept. The concepts of constructivism and post-modernism were not being discussed.

In sum, much has happened since the last definition of the field. Instructional Technology has evolved both as a profession and an area of academic study. The purpose of this book is to propose a new definition of the field based not only on a reexamination of the 1977 definition, but also upon the developments in research, theory, and practice.

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Chapter 1

The 1994 Definition of the Field

Instructional Technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning.

For at least forty years the field of Instructional Technology periodically has pursued processes of collective self-examination, resulting in statements which describe itself professionally. In 1963 such efforts produced the first formal definition of the field. This definition has been updated a number of times, with each change providing new directions for the field. Since the last formal definition seventeen years ago, dramatic changes in the profession and in technology have occurred. Consequently, this process of reexamination has once again evolved. The result of this collective analysis is the 1994 definition of the field shown above. This book will explore the dimensions of the new definition and its implications for both theory and practice. First, Chapter One will introduce the new definition by discussing the assumptions on which it was based and the implications of its terminology.

Assumptions of the Definition

The Nature of the Definition

Israel Scheffler (1960) distinguishes between general definitions and scientific definitions. According to Scheffler, scientific definitions are

technical, theoretically based and require special knowledge in order to understand them. They are embedded in a context of research. General definitions, on the other hand, can be understood by the public or other professionals. A general definition explains how a term is to be understood in the context in which it is used. Scheffler identifies three types of general definitions: stipulative, descriptive and programmatic. The definition of the field presented here meets Scheffler's criteria for a general definition of a stipulative and programmatic nature. This 1994 definition of the field is based on prior usage, stipulating what the field is equivalent to and encompasses, and suggests areas where research is needed. Therefore, it is a stipulative definition with programmatic implications intended to serve communication purposes.

A field can be defined in several ways: by the roles practitioners play, by areas of special knowledge, or by the requirements for being a professional in the field (Marriner-Tomey, 1989). Definitions can be logical or metaphorical or a combination of both. For example, a role in a field can be described through metaphor, such as portraying the instructional designer as an artist or a craftsman.

Before a definition is developed, parameters for the definition must be clarified. These parameters are the assumptions that provide a basis for making decisions. For a definition to be formulated, decisions must be made first about the scope, purpose, viewpoint, audience and essential characteristics to be taken into account. The 1994 definition of the field is based on the following assumptions:

- Instructional technology has evolved from a movement to a field and profession. Since a profession is concerned with a knowledge base, the 1994 definition must identify and emphasize Instructional Technology as a field of *study* as well as practice. In contrast, the 1977 definition placed more emphasis on practitioner roles.
- A revised definition of the field should encompass those areas of concern to practitioners and scholars. These areas are the domains of the field.
- *Both* process and product are of vital importance to the field and need to be reflected in the definition.

- Subtleties not clearly understood or recognized by the typical Instructional Technology professional should be removed from the definition and its more extended explanation.

Although not stated explicitly, several important characteristics of the field are implicit in the definition. First, it is assumed that both research and practice in the field are carried out in conformity with the ethical norms of the profession. It is further assumed that professional decisions of instructional technologists are guided by their understanding of those interventions which are more likely to yield effective results. Being aware of the knowledge base of 'what works' in diverse circumstances and using that knowledge base are important hallmarks of the Instructional Technology professional. Professional instructional technologists who fail to follow effective practices betray their lack of understanding of or commitment to the norms of the field.

Closely related to the concept of effectiveness is efficiency. The definition also assumes that practice in this field is characterized by efficient, economical pursuit of ends. Another hallmark that differentiates the professional from the lay person is the ability to achieve effective, productive ends in a way that is most direct, adroit, and cost-beneficial. There are many activities conducted by professional instructional technologists that are also conducted by others, such as developing computer courseware, selecting materials to use with learners, or making video recordings. The difference, it is assumed, is that the professional will be able to conduct these activities with a more efficient use of human and material resources. These characteristics and the values they imply are discussed further in Chapter Three.

Educational/Instructional Technology

Historically, the field has been called both 'Educational Technology' and 'Instructional Technology'. Those who prefer 'Instructional Technology' make two points. Their first point is that the word 'instructional' is more appropriate for describing the function of technology. Secondly, they argue that 'instructional' is more appropriate because 'Educational Technology' commonly implies a school or educational setting. To many the term 'instructional' incorporates not only K–12 set-

tings, but training situations as well. Knirk and Gustafson (1986) assert that 'instructional' relates primarily to teaching and learning problems, while 'educational' is too broad, encompassing all aspects of education.

Those who prefer the use of 'Educational Technology' argue that since instruction is considered by many as a *part* of education the term helps maintain a broader focus for the field (Association for Educational Communications and Technology, 1977; Saettler, 1990). They believe that 'educational' refers to learning in many environments, including home, school, work, and that the term 'instructional' connotes only school environments.

It seems that both groups have used the same rationale to justify use of different terms. There are also those who have used the terms interchangeably for many years as noted by Finn in 1965, nearly thirty years ago. The term 'Educational Technology' is preferred in England and Canada; however, the term 'Instructional Technology' is now widely used in the United States.

In the 1977 Association for Educational Communications and Technology (AECT) definition a distinction is also made between 'Educational' and 'Instructional Technology' and 'technology *in* education' based on the scope of each term. In 1977 'Educational Technology' was used to describe a subset of *education* which was involved in solving problems related to all aspects of human learning through complex, interrelated processes. This interpretation allowed 'Educational Technology' to encompass learning through mass media and support systems for instruction including management systems. 'Technology *in* education' was used to describe technological applications used by support systems for education such as grade reporting, scheduling and finance. 'Instructional Technology' was defined as a subset of 'Educational Technology' using the rationale that instruction is a subset of education which deals only with learning that is *purposive and controlled* (AECT, 1977).

Since 1977 the distinctions between these terms have disappeared. Currently, all three terms are used to describe applications of technological processes and tools which can be used to solve problems of instruction and learning. Today the profession is centering activities and concepts around instruction more and more, even if the instruction is incidental

(indirect) rather than intentional (constructed or directed). In other words, there is less emphasis on problems involved with all aspects of education and more emphasis on problems related to the effect of incidental or intentional instruction on learning. Therefore, it is difficult to sustain the proposition that 'Instructional Technology' and 'technology in education' are subsets of 'Educational Technology'.

At present the terms 'Educational Technology' and 'Instructional Technology' are used interchangeably by most professionals in the field. Because the term 'Instructional Technology' (a) is more commonly used today in the United States, (b) encompasses many practice settings, (c) describes more precisely the function of technology in education, and (d) allows for an emphasis on both instruction and learning in the same definitional sentence, the term 'Instructional Technology' is used in the 1994 definition, but the two terms are considered synonymous.

The Orientation of the Definition

When the Instructional Technology movement was in its infancy in the 1950s and the 1960s, many of the tools and theories of today were inconceivable. Programmed instruction developers foresaw computer-assisted instruction, but not interactive video or interactive multimedia. Audiovisual specialists saw the potential of games and simulations, but not of video games. The steps in instructional design were simpler then. One had only to master a few techniques and a fundamentally linear theory. The body of research was small because the mass of research on visual learning and other areas was still to come.

Since then society, education and Instructional Technology have become more diverse. The post-1960s period has been one of great technological creativity. Joel Mokyr, an economist from Northwestern University, believes that diversity is the key to continuing technological creativity in a culture (Mokyr, 1990). Diversity, not necessity, is the mother of invention according to Mokyr. Arnold Toynbee, the British historian, argues that when a more dynamic, creative civilization comes into conflict or contact with a more static, less creative civilization, the dynamic civilization will dominate. The society that loses its ability to change and create is superseded (Toynbee, 1957). Similarly, the field that becomes static and uncreative is likely to become less prominent. A definition that

clarifies the diversity of interests in the field will identify problems and areas of opportunity that can act as a catalyst for creativity and invention. We now turn to two questions: "What is technology?" and "How essential are the concepts of 'science' and 'systematic' to the meaning of technology?"

The Relationship Between Science and Technology. In his most recent history of Instructional Technology, Saettler (1990) speaks of technology as focusing on improvement of skills and organization of work rather than on tools and machinery. Modern technology is described as systematized practical knowledge which improves productivity. Similarly, Heinich, Molenda and Russell (1993) define Instructional Technology as "the application of our scientific knowledge about human learning to the practical tasks of teaching and learning."

Instructional Technology is often defined as the application of principles of science in order to solve learning problems, a point of view based upon the assumption that science and technology are inseparable. This has proved to be a myth. Science and technology are related, but separable. When considering everyday life in the 15th to 18th centuries, French historian Ferdinand Braudel says that:

> In a way everything is technology: not only man's most strenuous endeavors but also his patient and monotonous efforts to make a mark on the external world; not only the rapid changes we are a little too ready to label revolutions . . . but also the slow improvements in processes and tools, and those innumerable actions which may have no immediate innovating significance but which are the fruit of accumulated knowledge . . . "What I call technology", Marcel Mauss used to say, "is a traditional action made effective". In other words one which implies the action of one man or generation upon another . . . there are times when technology represents the possible, which for various reasons—economic, social or psychological—men are not yet capable of achieving or fully utilizing; and other times when it is the *ceiling* which materially and technologically blocks their efforts. In the latter case, when one day the ceiling can resist the pressure no longer, the technological breakthrough becomes a point of departure for rapid acceleration. However, the force that overcomes the obstacle is never a simple *internal* development of the technology or science (Braudel, 1979, pp. 334, 335).

Braudel reminds us that technology is not just the application of science, but that it includes improvements in processes and tools that allow one generation to build on the knowledge of a previous generation.

In keeping with Braudel's point of view, the idea that scientists make discoveries and technologists apply them is no longer in vogue among historians (Schwartz, 1992). Things are now thought to be more complicated than that, and technology is believed to stem from other sources in addition to science, such as art and social innovation (Brooks, 1980; Roller, 1971). Therefore, the 1994 definition does not include the concept of technology as *only* the application of science since this is not totally supported by current literature.

The Concept of Systematic. The concept of 'systematic' is implicit in the definition of technology proposed by Everett Rogers. Rogers says that technology is "a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome" (Rogers, 1983, p. 12). He goes on to say that technology usually has two components: a hardware aspect, consisting of tools, and a software aspect, consisting of information.

Cass Gentry (1991) reviews several definitions of Instructional Technology that do not include 'systematic' as an essential characteristic:

> the body of knowledge resulting from the application of the science of teaching and learning to the real world of the classroom, together with the tools and methodologies developed to assist in these applications (Dieuzeide, as cited in Gentry, 1991, p. 4).

> is concerned with the overall methodology and set of techniques employed in the application of instructional principles (Cleary, et. al. as cited in Gentry, 1991, p. 4).

> an effort with or without machines, available or utilized, to manipulate the environment of individuals in the hope of generating a change in behavior or other learning outcome (Knezevich and Eye, as cited in Gentry, 1991, p. 5).

Still, based on other definitions reviewed, Gentry defines Instructional

Technology as "the systemic and systematic application of strategies and techniques derived from behavioral and physical science concepts and other knowledge to the solution of instructional problems." By 'systemic' he means that all things impact and are affected by other things in their environment. In comparison he defines educational technology as "the combination of instructional, learning, developmental, managerial, and other technologies as applied to the solution of educational problems" (Gentry, 1991, p. 7–8).

The concept of systematic is implicit in this 1994 definition because the domains are equivalent to the steps in a systematic process for developing instruction. Nevertheless, the 1994 definition de-emphasizes systematic in the sense of a linear process that is the totality of the technological approach.

One of the most comprehensive systems-oriented definitions of Instructional Technology was given by Robert Gagné who said that Instructional Technology is concerned with studying and establishing conditions for effective learning.

> Some of these conditions were, to be sure, the capacities and qualities of the *individual human learner*, including such things as visual and auditory abilities, speech and print comprehension abilities, and so on. Other conditions, in fact the other large set, were *media-based* conditions, pertaining to the kind of presentation made to the learner, and to its timing, sequence and organization (Gagné, 1990, p. 3).

Even though this definition is focused on the research questions pursued by the profession, it seems limited now in light of the current constructivist descriptions of learning environments. However, if one assumes that establishing conditions for learning includes establishing learning environments, Gagné's definition still remains a comprehensive, yet precise statement of the concerns of Instructional Technology.

The Structure of the Definition. The 1994 definition recognizes both the established traditions and trends in the field. In the 1970s terminology of the field was rooted in different types of media, including computer-assisted instruction and instructional television, and in teaching activities, such as independent study and simulations. In contrast, the field's current literature contains not only media descriptors, but also

learning variables and strategies with more emphasis on techniques and theories than on media categories. In addition, the areas identified by terminology are covered in more depth today. The diversity of the field and profession is reflected in its current terminology and the range of Instructional Technology doctoral dissertation topics (Caffarella and Sachs, 1988; Caffarella, 1991). The 1994 definition provides for current diversity and specialization while incorporating the traditional components of definitions and domains in the field.

The revised definition is:

> *Instructional Technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning.*

Each domain in the field contributes to the theory and practice which is the basis for the profession. The domains are independent, though related. There is *no linear relationship* between the domains. Figure 1.1, The Definition of Instructional Technology, highlights the relationship of domains of the field to theory and practice.

Components of the Definition

According to the 1994 definition, Instructional Technology is:

- the theory and practice;
- of design, development, utilization, management and evaluation;
- of processes and resources; and
- for learning.

The definition's meaning is derived from each component. This section explains the components and how they describe what professionals in this field do and study.

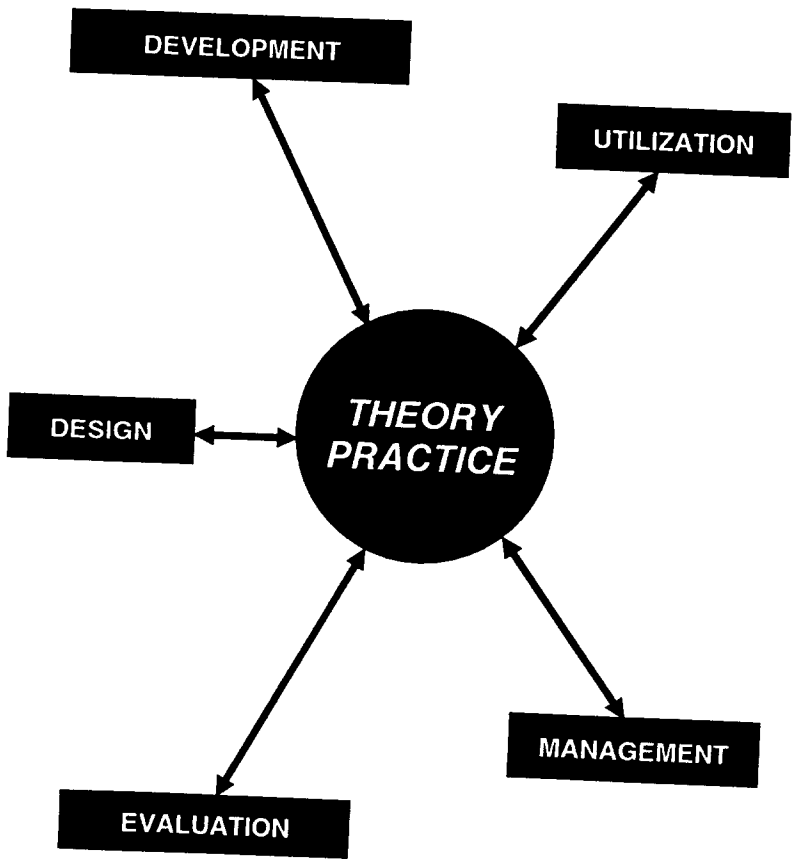
The Theory and Practice

A profession must have a knowledge base that supports practice. Each domain of Instructional Technology includes a body of knowledge

Figure 1.1

The Definition of Instructional Technology

Instructional Technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning.



based on both research and experience. The relationship between theory and practice is nurtured by a mature field. *Theory consists of the concepts, constructs, principles, and propositions that contribute to the body of knowledge. Practice is the application of that knowledge to solve problems.* Practice can also contribute to the knowledge base through information gained from experience.

Both theory and practice in Instructional Technology make extensive use of models. Procedural models, which describe how to perform a task, help to connect theory and practice. Theory can also generate models that visualize relationships; these models are called conceptual models (Richey, 1986).

Of the Design, Development, Utilization, Management and Evaluation

These terms refer to both areas of the knowledge base and to functions performed by professionals in the field. These are the five basic domains of Instructional Technology. Each of these functions has sufficient uniqueness and scope to have evolved as a separate area of study. The domain of design represents the largest theoretical contribution of Instructional Technology to the larger field of education. The domain of development is also mature and represents the largest contribution to practice. The domain of utilization, on the other hand, is not well developed either theoretically or practically. Although much has been done in the area of media utilization, other areas of the domain languish for lack of attention. The domain of management has always been part of the field because the resources to support each function must be organized and supervised (managed). The domain of evaluation still rests on research from other fields. The major contribution from this area of study is formative evaluation. The domains of Instructional Technology will be discussed in Chapter Two.

Of Processes and Resources

This phrase encompasses the traditional elements of both process and product in the definition. *A process is a series of operations or activities directed towards a particular result.* In Instructional Technology

there are both design and delivery processes. A process implies a sequence involving input, actions and output. The more recent research into instructional strategies and their relationship to types of learning and media is an example of the study of processes (Leshin, Pollock and Reigeluth, 1992). Instructional strategies are methods for selecting and sequencing activities. Examples of processes are delivery systems, such as teleconferencing; types of instruction, such as independent study; models for teaching, such as the inductive approach; and models for the development of instruction, such as instructional systems design. A process is usually procedural, but not always. When a formal set of steps is followed, the process is procedural, but when the order of actions is less structured, the process may not be procedural.

Resources are sources of support for learning, including support systems and instructional materials and environments. The field grew from an interest in the use of instructional materials and communications processes, but resources are not only the devices and materials used in the process of learning and teaching, but also people, budget, and facilities. Resources can include whatever is available to help individuals learn and perform competently.

For Learning

The purpose of Instructional Technology is to affect and effect learning. The phrase was chosen to emphasize learning outcomes and clarify that learning is the goal and that instruction is a means to learning. Learning, as evidenced by a change in knowledge, skills or attitudes, is the criterion for instruction. In the definition, *learning refers to "the relatively permanent change in a person's knowledge or behavior due to experience"* (Mayer, 1982, p. 1040). Berlo (1960) compares learning to the communication process by showing that the ingredients in learning parallel the ingredients in communication. Thus, in communication a message moves through a channel to a decoder who receives it and encodes a new message that provides feedback to the sender. While engaged in the learning process, one perceives, interprets and responds to a stimulus and learns from the consequences of the response.

Evolutionary Nature of the Definition

The 1994 definition evolved from previous definitions of the field. This section will explain how the definition evolved.

Historical Background

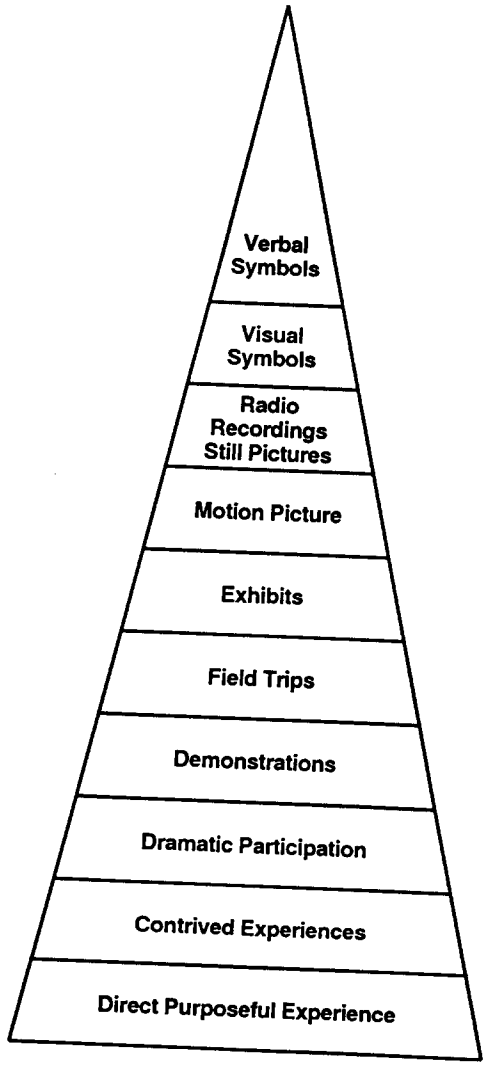
Saettler (1990) admits having difficulty identifying the source of the term 'educational technology'.

> It is unclear who first used the term *educational technology*. We have documented evidence that Franklin Bobbitt and W.W. Charters used *educational engineering* in the 1920's. This author first heard *educational technology* used by W. W. Charters in an interview with this author in 1948 . . . The late James D. Finn used *instructional technology* in a forward he wrote for the first publication of the NEA-sponsored Technological Development Project in 1963. However, the focus of the application was *audiovisual communications* (Saettler, 1990, p. 17).

Educators like John Dewey (1916), William Heard Kilpatrick (1925) and W.W. Charters (1945) laid the foundation for the concept of educational technology. But modern technology is primarily a post World War II idea. While the process definition of Instructional Technology has its roots in the educational practice of the progressive era, the popular belief is that Instructional Technology evolved from the audiovisual communications movement (Saettler, 1990). Educational technology was first seen as a tool technology. It referred to the use of devices, media and hardware for educational purposes. Thus, the term was synonymous with the phrase 'teaching with audio-visual aids' (Rountree, 1979).

The field is a result of the flowing together of three streams of interest: media in education, psychology of instruction and systematic approaches to education (Seels, 1989). Two individuals, Edgar Dale and James Finn, are credited with making major contributions to the development of modern Instructional Technology and its earliest definition. Dale developed the Cone of Experience which is shown in Figure 1.2. The cone served as a visual analogy for levels of concreteness and abstractness of teaching methods and instructional materials. The purpose

Figure 1.2
Dale's Cone of Experience



Note. From *Audio-Visual Methods in Teaching* (p. 39) by E. Dale, 1946, New York: Dryden Press.

of the cone was to represent a range of experience from direct experience to symbolic communication. It was based on a concrete to abstract continuum.

It was Dale's belief that abstract symbols and ideas could be more easily understood and retained by the learner if they were built on concrete experience. Dale's cone melded the educational theory of John Dewey and ideas in vogue in psychology at the time. The Cone of Experience was the first attempt to build a rationale that involved both learning theory and audiovisual communications (Dale, 1946).

Jim Finn was a doctoral student of Edgar Dale. Finn has been credited with moving the field of audiovisual communications to instructional technology (AECT, 1977). A major thrust of Finn's work was to change the role of audiovisual communications personnel functionally supportive of the instructional process to one of leadership and innovation. Finn asserted that for audiovisual communications to become a profession the field must develop its own theory, research and technique (Finn, 1953). He argued that Instructional Technology is an intellectual process that must be based on research (Finn, 1960). Finn made two other contributions to the field. He was a strong advocate for changing the name of the field to Instructional Technology (Finn, 1965), and he promoted the application of systems theory as a basis for the field (Finn, 1956). Finn's concept of integrated systems and processes incorporated and expanded Dale's idea of the inter-relatedness of materials and processes.

Definitions of Instructional Technology

AECT's 1963 Definition. There have been many definitions of educational technology (AECT, 1977; Ely, 1983). Six of the definitions are considered mainstays because they are cited most frequently in the literature (Ely, 1973; Ely, 1983). The Technological Development Project of the National Education Association provided the first definition.

> Audiovisual communications is that branch of educational theory and practice primarily concerned 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 nonrepresentational 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, pp. 18–19).

The purpose of the 1963 definition was "to provide a working definition for the field of instructional technology which will serve as a framework for future developments and lead to an improvement of instruction" (Ely, 1963, p. 8). The definition was one stimulus for changing the name of the organization from Department of Audiovisual Instruction to the Association for Educational Communications and Technology. In the report on the proposed definition the Task Force on Definition and Terminology stated, "The *audiovisual communications* label is used at this time as an expedient. Another designation may evolve, and if it does, then it should be substituted" (Ely, 1963, pp. 18–19). Ely believed that there was value in keeping the general term of "audiovisual communications" until personnel in the field were uncomfortable with it (Ely, D. P. Personal Communication, October, 1963).

Another important factor in the 1963 definition was the listing of the roles or functions of those involved with the field. This approach helped move the field from a product orientation, which focused on things and identified the field with machines, to a process orientation, which dictated a dynamic and continuous relationship between events (Ely, 1963).

Finally, there is the mention of efficient utilization. Efficiency is one of the key characteristics of any technology, including instructional technology (Heinich, 1984). In educational circles efficiency can be a "loaded" word because it generates an emotional response. Perhaps this is the reason that the word efficiency does not appear in any of the other major definitions of educational technology. Another acknowledged difficulty with this definition was the decision to use the word 'control'. It was deliberately chosen to suggest that outcomes were highly predictable (Ely, 1973).

Commission on Instructional Technology's 1970 Definition. The second major effort to define the field was made by the President's Commission on Instructional Technology. The commission's report stated that the field could be defined in two ways:

> In its more familiar sense it means that media born of the communications revolution which can be used for instructional purposes alongside of the teacher, textbook and blackboard . . . the pieces that make up instructional technology: television, films, overhead projectors, computers and other items of 'hardware' and 'software' . . . [and]
>
> [Instructional technology] . . . is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in 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).

The two definitions perpetuated the ambiguity surrounding educational technology. There were several new aspects to the latter definition. First, there was the idea that Instructional Technology must include specific objectives. This is probably due to the influence of B. F. Skinner (1954) and Robert Mager (1962). Their ideas were adopted widely by practitioners in the field. Second, there was the idea that methods and techniques used to teach specific objectives should be based on research. Third, there was the phrase 'more effective instruction'. Effectiveness is also a key characteristic of technology (Heinich, 1984). Nevertheless, the word 'effectiveness' has not been included in the major definitions of the field. Perhaps the reason for this is because effectiveness is typically assumed once Instructional Technology principles are utilized.

A subtle but important difference between the 1994 definition and the 1963 definition is the shift in vocabulary from 'systems' to 'systematic'. The concept of systems can be complicated; perhaps the use of the word 'systematic' was an attempt to simplify and clarify the process of Instructional Technology.

Silber's 1970 Definition. The third influential definition was pro-

vided by Kenneth Silber who later chaired the AECT Committee on Definition and Terminology.

> Instructional Technology is the Development (Research, Design, Production, Evaluation, Support-Supply, Utilization) of Instructional Systems Components (Messages, Men, Materials, Devices, Techniques, Settings) and the Management of that development (Organization, Personnel) in a systematic manner with the goal of solving educational problems (Silber, 1970, p. 21).

This definition differs in three ways from the 1963 definition. The notion of development is different in this definition than it was in the earlier definition. In the first definition 'development' refers to the development of human potential, an idea that is important to the more traditional approach of educational psychology. In Silber's definition 'development' is used as an inclusive term to mean designing, producing, using and evaluating technology for instruction. The 1970 definition assumes, as does the 1963 definition, that Instructional Technology is a man-machine system and that experience is interrelated with materials. The 1970 definition follows previous definitions by identifying roles performed by educational technologists. It differs in that it changes the scope of educational technology by listing additional components of the field (i.e. techniques, settings). The extension of components provided opportunity for new investigations under the name educational technology. Nevertheless, the focus on roles and components gave many the impression that educational technology was oriented more to practice than to theory. The idea of 'problems' is first introduced in Silber's definition and is at the core of the definition. The idea of educational technology as a problem solving activity will be included in subsequent definitions. Finally, Silber's definition does not stand neatly by itself. It is essential to read the article which elaborates on the definition in order to understand it. Subsequent definitions also will depend on similar elaboration.

MacKenzie and Eraut's 1971 Definition. This definition from the United Kingdom is succinct, but it seems too broad to be useful for accurately describing educational technology.

> Educational technology is the systematic study of the means whereby educational ends are achieved (as cited in Ely, 1973, p. 52).

Previous definitions included the words 'machine', 'instruments', or 'media'. This definition is the first that does not mention hardware or software. It is a process-based account of the field; although hardware may be inferred as part of the means. While the MacKenzie and Eraut definition does not explicitly address the issue, the use of the word 'study' seems to place more emphasis on the idea that Instructional Technology is an intellectual endeavor than do the two 1970 definitions which do not mention this word. MacKenzie and Eraut expand the concept of 'study' by referring to a study of the means. This extension is a much broader concept than the study of pictorial and non-representational messages. The 'systematic study of the means' also infers that educational technology may be considered an area of inquiry. Note also the use of the term systematic. MacKenzie and Eraut thus suggest educational technology is an academic field or discipline. Although the idea is not present in subsequent definitions; it is reintroduced in this 1994 definition.

AECT's 1972 Definition. This definition was approved by the Association and was an outgrowth of the Committee on Definition and Terminology which was active at that time.

> 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 (AECT, 1972, p. 36).

This definition states that educational technology is a systematic process for developing and using instructional resources. These ideas are carried over from the 1963, 1970, and 1971 definitions and are incorporated in the 1994 definition. Many of the same roles identified in previous definitions are repeated in this definition (e.g. development, organization, management and utilization). The 1972 definition attempts to identify educational technology as a field (Ely, 1972). The ideas of 'control' and 'specific objectives' are replaced in this definition by the ideas of 'process' and 'facilitation of human learning' (Ely, 1983). This definition left open the possibility that educational technology could be concerned with ends

other than pre-determined ends specified as objectives. The use of the word facilitation in definitions of educational technology began and ended here; although Donald Ely commented that the word 'facilitation' would have been better than 'control' in the 1963 definition (Ely, D.P, Personal Communication, January, 1993).

One characteristic of the 1972 definition was the decision to define audiovisual communications as a field. This action promoted the idea that audiovisual communications is a profession. During the development of this definition an important philosophical debate centered around Robert Heinich's idea that the field was defined by the concept of 'system' and Kenneth Silber's emphasis on the function of individualizing instruction as a defining characteristic.

AECT's 1977 Definition. The complete official definition was sixteen pages in length. This is an abbreviated version.

> 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 (AECT, 1977, p. 1).

The 1977 definition attempted to identify educational technology as a theory, a field and a profession. With the exception of AECT's 1963 definition, prior attempts at definition had not emphasized educational technology as a theory. The change in wording from the 'men' in prior definitions to 'people' is also noteworthy. It indicates a greater sensitivity to gender issues by both the committee and the AECT organization.

Conclusions

When one compares the definitions just presented, it becomes clear that several concepts appear in many of the definitions although the context and meaning of the concept may vary. Words like 'systematic', 'resources', and 'processes' occur frequently. Words that are precursors of the domains in the 1994 definition also occur in earlier definitions, including 'design', 'development', 'use' or 'utilization', 'organization'

or 'management' and 'evaluation'. On the other hand, words used in earlier definitions have been eliminated from later definitions, words including 'control', 'facilitation', 'procedures', 'man/machine', and 'devices'. Each definition makes a statement of purpose related to goals, means/ends, learning and problem solving. Yet when we look at the definitions chronologically, it is interesting that the 1994 definition is closer to the 1963 and 1971 definitions than to later definitions. This is because the stated goal in both was to effect the learning process. It is also because the 1963 definition was based more on theory and practice than on the functions emphasized in later definitions.

In 1973 Ely discussed the idea that definitions of Educational Technology share three major themes which present the ideas that educational technology is:

- a systematic approach,
- a study of means, and
- a field directed toward some purpose (Ely, 1973).

The 1994 definition interprets means as processes and resources and systematic as the domains of design, development, utilization, management, and evaluation. It reflects the evolution of Instructional Technology from a movement to a field and a profession and the contributions this field has made to theory and practice.

Sources of Information

The following sources are suggested for further study of the topics in this chapter. The complete list of references, including those cited in this chapter, can be found at the end of the book.

Branyan-Broadbent, B. and Wood, R. K. (Eds.). (1993). *Educational media and technology yearbook*. Englewood, CO: Libraries Unlimited.

Ellington, H. and Harris, D. (1986). *Dictionary of instructional technology*. London: Kogan Page.

Eraut, M. (Ed.). (1989). *The international encyclopedia of educational technology*. NY: Pergamon Press.

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Chapter 2

The Domains of the Field

The 1994 definition is built around five separate areas of concern to instructional technologists: Design, Development, Utilization, Management, and Evaluation. These are the domains of the field. In this chapter there are definitions for each of these domains, the domain subcategories, and related concepts.

The Role of the Domains

The Functions of the Domains

To complete the task of defining a field, a means for identifying and organizing the relationships emerging from theory and practice must be developed. Taxonomies, or classifications, are often used to simplify these relationships (Carrier and Sales, 1987; Knezek, Rachlin and Scannell, 1988; Kozma and Bangert-Downs, 1987). A taxonomy is a classification based on relationships. In the classic *Taxonomy of Educational Objectives: Cognitive Domain*, Benjamin Bloom differentiates between a taxonomy and a simpler classification scheme. According to Bloom, a taxonomy: (1) may not have arbitrary elements, (2) must correspond to some real phenomena represented by the terms, and (3) must be validated through consistency with the theoretical views of the field.

> The major purpose in constructing a taxonomy . . . is to facilitate communication . . . the major task in setting up any kind of taxonomy