DOCUMENT RESUME

ABSTRACT
        This monograph proposes and describes a systems-based
field of study for the training and development (T&D) profession:
human performance technology. The first section describes what is
meant by a field of study and professional practice and then provides
a rationale for the proposal. Section 2 explores training and
development in the context of the growth of a new professional
specialization. Section 3 presents an overview and description of
human performance technology and then proposes a formal goal and
definition of the field. In section 4, implications are set forth
that should have relevance in two areas related to T&D: professional
practice and academic programs. The final section presents 11
propositions that encapsulate the general characteristics of the
field. These propositions illustrate that the uniqueness of the T&D
profession lies in its role of helping people improve their
performance using all aspects of the work environment and systems to
make these improvements occur. Conclusions and a 74-item reference
list are included. (SK)

HUMAN PERFORMANCE TECHNOLOGY: A SYSTEMS-BASED FIELD FOR THE TRAINING AND DEVELOPMENT PROFESSION

Ronald L. Jacobs

The Ohio State University

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For further information contact:

Program Information Office
National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210-1090
Telephone: (614) 486-3655 or (800) 848-4815
Cable: CTVOCEDOSU/Columbus, Ohio
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FOREWORD

The Educational Resources Information Center Clearinghouse on Adult, Career, and Vocational Education (ERIC/ACVE) is 1 of 16 clearinghouses in a nationwide information system that is funded by the Office of Educational Research and Improvement, U.S. Department of Education. This paper was developed to fulfill one of the functions of the clearinghouse--to interpret the literature in the ERIC database. This paper should be of interest to adult, career, and vocational educators and others concerned with the evolution of the training and development profession.

The profession is indebted to Ronald L. Jacobs, Assistant Professor in the Department of Educational Policy and Leadership, The Ohio State University, for his scholarship in the preparation of this paper. Dr. Jacobs is also Coordinator of the Graduate Specialization in Training and Development and Adjunct Scientist at the Edison Welding Institute at Ohio State. The author of a number of publications on human performance technology and instructional design, Dr. Jacobs has presented professional development seminars on such subjects as on-the-job coaching, interpersonal communication skills, and job analysis. His professional service activities include membership on the advisory board of *Performance and Instruction Journal*, chairing the graduate student research committee of the National Society for Performance and Instruction (NSPI), and the vice presidency of the Heartland Chapter of NSPI.

Recognition is also due to Douglas Smith, Associate Professor of Adult Education and Human Resource Development, Florida International University; Jerry W. Gilley, Assistant Professor of Adult Education and Human Resource Development; and Mark Newton, Associate Director, Personnel Development and Field Services, and Morgan Lewis, Senior Research Specialist, of the National Center for Research in Vocational Education for their critical review of the manuscript prior to publication. Wesley Budke coordinated the publication's development, with editorial assistance from Sandra Kerka. Clarine Cotton and Jean Messick typed the manuscript; Janet Ray served as word processor operator. Editorial review was provided by Elizabeth Martin.

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Ray D. Ryan
Executive Director
The National Center for Research
in Vocational Education

</div>

EXECUTIVE SUMMARY

When inquiring about the intellectual nature of a profession, it is not enough to provide descriptions of what members of the profession do. It is also necessary to investigate the theoretical frameworks that guide and support professional practice. Professionals in the training and development (T&D) field are currently debating the existence of an integrated theoretical framework and how it might support practice in their field. In response to this issue, this monograph proposes and describes a systems-based field of study for the T&D profession--human performance technology.

The rationale for this proposal is based upon systems theory, which has been useful for the continued improvement and growth of many practice areas. Another component is the proposition that skillful professional practice requires the integration of both thought and action. Such "theories of action" stem from a combination of experience and formal training.

As background to the proposed field of study, training and development are explored in the context of the growth of a new professional specialization. Three criteria for identifying a profession are discussed in relation to T&D: specialized areas of knowledge and skill, intensive preparation for practice, and conformity to ethical and technical standards.

The goal of human performance technology (HPT) is defined as the use of systems approaches to ensure that individuals have the knowledge, skills, motivation, and environmental support to do their jobs efficiently and effectively. The conceptual domain of HPT is defined by three key aspects: (1) functions to manage the development of human performance systems or other management functions, (2) functions to develop human performance systems, and (3) components of human performance systems.

The description of the HPT field encompasses the following dimensions:

o The distinction between human performance and human behavior

o The determination of worthy performance as a function of the value of the accomplishment and the costs to achieve it

o The application of systems approaches to five components of HPT systems--the job, the person, responses, consequences, and feedback

o The engineering of human performance

o Analysis of performance problems, needs, and goals

o The role of exemplary performance

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o Causes of human performance problems

o Five classes of solutions--training, job performance aids, feedt .ck systems, employee selection, and organizational redesign

HPT is then defined as the development of human performance systems and the management of that development using systems approaches to achieve organizational and individual goals.

Implications of the proposal are related to professional practice and academic programs. In terms of practice, the use of a systems approach makes the goals of T&D professional activities more congruent with that of the organization. The success of T&D professionals depends to an extent upon their effects on the organization's bottom line results.

Academic programs for T&D must be based on a set of core competencies and a unique theoretical base, preferably HPT. T&D programs should (1) be based on the need to study the field of study, (2) focus on specific T&D job roles, and (3) include a structured practicum experience.

Eleven propositions that encapsulate the general characteristics of the field are presented. These propositions illustrate that the uniqueness of the T&D profession lies in its role of helping people improve their performance using all aspects of the work environment and systems to make these improvements occur.

Information on human performance technology may be found in the ERIC system using the following descriptors and identifiers: *Human Factors Engineering, *Job Performance, Labor Force Development, *Management Systems, *Performance Technology, Postsecondary Education, Problem Solving, Professional Occupations, Theory Practice Relationship, *Training, Training Objectives. Asterisks indicate descriptors having particular relevance.

INTRODUCTION

The character of most inquiry is a search for answers and the discovery of more meaningful questions. This process also seems true when inquiring about the intellectual nature of a profession. It is not enough to provide descriptions of what a group of professionals do, nor is it enough to propose theoretical frameworks that are not connected to practice in that profession. Rather, there is a need to inquire about those theoretical frameworks that guide and support professional practice. In order to be useful, the frameworks must be intellectually sound as well as responsive to the demands of real practice settings. Use of such frameworks helps professionals to order the complex phenomena they encounter and allows the formation of new, and possibly more meaningful, questions. Revisions of previous notions are an expected result, leading to deeper levels of understanding and professional skill. Thus, the process of generating new questions may be more important than providing answers to old questions.

Such is the current nature of the training and development (T&D) profession. T&D is used here to designate a specific practice area that may also be referred to as human resource development (HRD). Accurate estimates about the total amount spent on corporate T&D programs have been difficult to calculate. Regardless, there can be no doubt that this amount is large (some estimates are over $210 billion) and that this amount will continue to increase each year as more organizations start new programs (*Serving the New Corporation* 1986). The reasons offered for this increasing investment in T&D and organizational results derived from these programs differ to some degree. However, one generally recognized outcome has been the increased visibility and perceived importance of the individuals who design, implement, and manage T&D programs. Although specific T&D job roles and situations may vary across corporate settings, it can be said that these individuals share many professional interests, encounter similar types of problems, and use similar approaches and procedures to do their work. Based on these shared experiences and activities, a distinct T&D profession is emerging.

Much information has recently been reported about the T&D profession; most of it, however, seems limited to describing what they do and how they do it. Documenting this descriptive information is important in its own right, but the profession is being challenged to move beyond this type of inquiry as an end in itself. A growing number of T&D professionals, from both academic and practice settings, have raised questions about whether an integrated theoretical framework exists for the profession and how that framework might support professional practice. In response to this basic issue, a systems-based field of study will be proposed--human performance technology.

Obviously, some degree of risk-taking is involved in making this proposal. Strong arguments can be made for positions other than the ones presented here. In some instances, the alternate positions may provide an equally helpful explanation of human resource issues. The T&D profession is composed of a diverse group of individuals. Most agree that T&D practices can contribute much to increasing the effectiveness of organizations and the job satisfaction of individuals. Yet, for a variety of reasons, many of those promises have gone unfulfilled. Possibly the generation of new questions, based upon the consideration of the proposed field of study, can help us begin

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to realize the potential. Thus, the underlying intent of this report is to move current thought along to the next level of questioning among adult, career, and vocational educators.

The primary purpose of this monograph is to propose and describe a systems-based field of study for the T&D profession, human performance technology (Jacobs forthcoming; Stolovitch 1982). This section describes what is meant by a field of study and professional practice and then it provides a rationale for the proposed

A Field of Study and Professional Practice

In general, a field of study uses selected aspects from a number of theories, other fields of study, and disciplines and molds them into a unique body of knowledge (Heinich 1980). The impetus for a field of study comes from efforts to meet some societal need, about which certain groups of professionals are called upon to use their specialized knowledge to address those needs. For example, T&D professionals are primarily looked upon by organizations as having the knowledge necessary to improve the job skills of employees. It is recognized that important societal goals cannot be achieved without first understanding the context, boundaries, and variables that are part of the problem setting. As such, a field of study makes best use of those bodies of knowledge from which established principles or heuristics can be derived to solve applied problems. Questions about the adequacy of a field of study must include whether the body of knowledge is internally logical and empirically based.

Professional practice is defined by the common settings, particular kinds of units of structured activities, including programs, projects, courses, and patterns of problem solving that are associated with a particular profession. These features help frame the conditions under which a profession is practiced. Actual professional practice is composed of several different large chunks of activity. Although practitioners may differ from one another in their styles, perspectives, and specific skills related to these activities, most share a common body of professional knowledge from which they interpret problem situations, formulate goals, and select actions (Schoen 1987). This special body of knowledge helps establish the boundaries for those professionals and sets them off as a group to be granted special recognition for their knowledge. Considered in this way, a field of study can form the common body of knowledge that determines the unique content and boundaries of professional practice.

Rationale

Systems theory forms the unifying structure for a number of professional practice areas, including engineering, architectural design, industrial technology, and instructional technology. Systems theory is conceived of as "a complex grouping of human beings and machines for which there is an overall objective" (Checkland 1972, p. 91). Systems are characterized by inputs, transformation processes, outputs, and a feedback channel that translates the outputs into a signal to control the input of the process. The concept of systems theory has been extended to apply to social systems (von Bertalanffy 1968) in general and organizations specifically (Katz and Kahn 1966).

Systems theory has been useful for the continued improvement and growth of many practice areas. For example, until recently most school media specialists viewed their job as that of reacting to faculty requests for media hardware and software. As the field of instructional technology was more clearly defined and understood (Silber 1970), media specialists were urged to use their special knowledge and skills in using systems approaches to solve instructional problems.

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As a result, in many schools they have become a more equal partner in the instructional planning process. Of note, the major catalyst for this change in perception was provided by those in the academic community. Today, it is generally acknowledged that the role of media specialists is more proactive and their contributions less dependent on the use of instructional media (Heinich 1984). Of importance here is that the process of clarifying a systems-based field of study to support the professional role of media specialists has resulted in improving their practice and guiding them to new areas of growth.
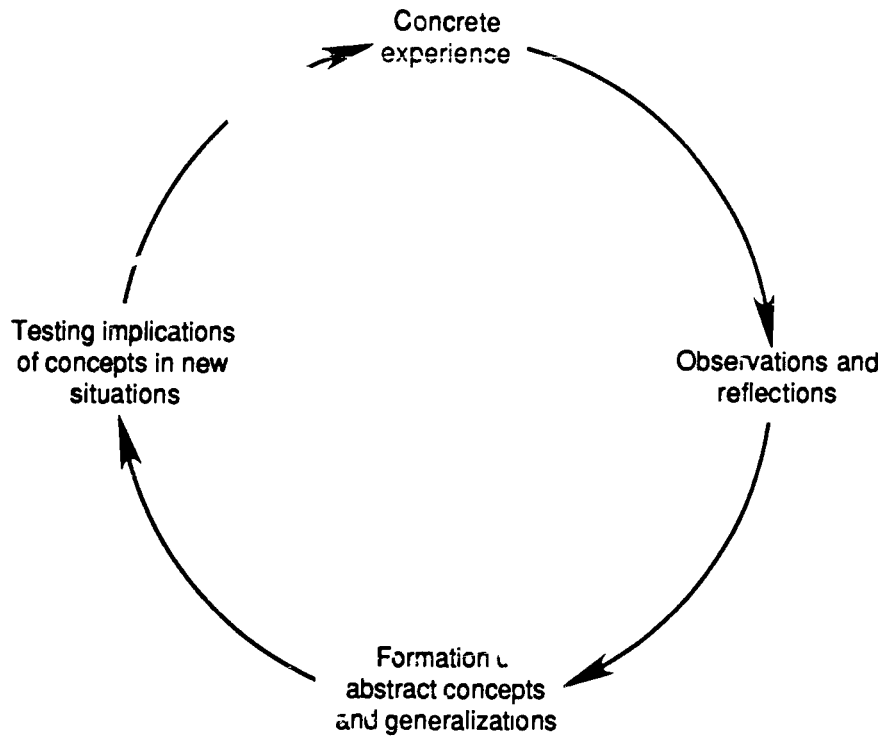
In general, T&D professionals have not recognized a systems-based field of study. This is partly a function of the emergent nature of the T&D profession and the type of work involved. In doing their work, T&D professionals tend to be problem or product-oriented. Jobs, titles, and skill sets tend to be defined by organizations along these sometimes confining boundaries and, thus, it makes sense for practitioners to consider only their present functions, that is, to decide what functions require performing (or what problems solving) and then to prepare only for those specific functions. Missing from this analysis, however, are considerations about an integrated framework that can help establish standards for professional performance and outline new areas of professional activity, consistent with that field of study.

In this discussion is the implicit position taken regarding the relationship of theory and the application of that theory. The recent literature makes clear that traditional views have unnecessarily segregated basic science, applied science, and the technical skills of day-to-day practice. These distinctions have resulted in limiting our understanding about what constitutes effective practice of professionals in real settings. An alternate view proposes that skillful professional practice requires the integration of both thought and action (Argyris 1982: Argyris and Schoen 1975). Such action is based on the professional's previous knowledge of how to respond in similar types of situations.

Argyris (1982) has termed this special kind of knowledge, "theories of action." Theories of action are the conceptual structures and visions that provide reasons for action and that in turn will foster the development of a more reliable technology of practice. These conceptual structures must rest upon some conception of practice in a real setting, since the environment shapes action and gives context to its meaning. Theories of action are supported by principles or propositions that undergird our actions and may be an explicit or a tacit part of our professional consciousness. Professionals generate many different theories of action, depending upon the intentions of their actions, the timing of the action within the context of practice, the specific features of the situation, and the consequences of action as the theory is being used.

How professionals formulate theories of action is far from clear; they probably develop under some combination of experience and formal training. Experience is important because it provides the actual setting from which new theories of action can be generated and tested. Through a process of inquiry, a professional can then develop individual theories of action. A means to understand this process, described by Kolb (1980) as part of his theory of experiential learning, is shown in figure 1. In the model, a person encounters a new idea, reflects on it, compares it to what else he or she knows, and makes a judgment about whether it makes sense. If it does make sense, it may be tested in a real setting, and on the basis of the consequences of the test, the person may reflect upon the meaning of the consequences and then formulate new theories or revise existing theories.

Of increasing importance in this process is the role of formal training. Why some persons use theories of action as a natural part of their professional practice is not exactly known. In one sense, training can transmit the specific skills believed necessary to reflect before taking

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Concrete
experience

Observations and
reflections

Formation ⊾
abstract concepts
and generalizations

Testing implications
of concepts in new
situations

SOURCE: Adapted from Kolb (1980)

Figure 1. Experiential learning model

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action. Schoen (1987) makes the point that reflection skills are an essential component of professional preparation, though the development of these skills are well dependent upon the experiences of the individual on the job. Schoen indicates that training can also pertain to communicating the common body of knowledge, or field of study, relevant to those professionals. Training in this sense, along with providing the skills necessary to develop theories of action, enables professionals to interpret the significant features of a situation and use their specific knowledge to choose actions that are appropriate to produce desired results.

If theories of action are individual activities that can be used to improve professional practice, and if the success of this activity is facilitated by knowledge of the field of study that is supportive of that profession, then knowledge of the field of study is important for improved professional practice. This monograph proposes that human performance technology, a systems-based field, forms the common body of knowledge for the T&D profession. As such, an important component for improving professional practice in T&D depends on those individuals drawing from this field to guide and support their professional practices.

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TRAINING AND DEVELOPMENT

T&D, as it exists today, is a relatively new professional career choice that embodies a variety of specialties and responsibilities, whose general purpose is to foster a desired change in the performance of a defined audience in an on-the-job environment (Goldstein 1980). Increasingly, the term human resources development (HRD), as opposed to training and development (T&D), has been used to refer to th's specific area of professional practice. Nadler (1983) defined HRD as "organized learning experiences, in a given period of time, to bring about the possibility of performance change or general growth for the individual within an organization" (p. 1). HRD is one of three major human resource functions commonly found in organizations, the others being human resource management (HRM) and human resource environment (HRE). The three human resource functions and the activities of each are as follows (Nadler and Wiggs 1986):

o Human resource development

   --Training
   --Education
   --Development

o Human resource management

   --Recruitment
   --Selection
   --Placement
   --Appraisal
   --Compensation
   --Work force planning

o Human resource environment

   --Job enrichment
   --Job enlargement
   --Organizational development

In spite of the general acceptability of the term HRD, T&D is the preferred term used in this monograph. One reason is the increased recognition by practitioners that *learning experiences* are only one of many ways to improve human performance. Interventions not specifically related to human learning include job performance aids, selection, job redesign, and feedback systems. These interventions may be considered more a part of the HRM and HRE functions. It is not the intention of this monograph to redefine the HRD function. Rather, the concern is to guide professionals in the use of an array of interventions to solve human performance problems within an integrated systems perspective. Using the term T&D allows for less confusion with established understandings about HRD.

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For many different reasons, individuals in the T&D profession have been subjected to cycles of fast employment growth, changes in role expectations, and periodic staff reductions. Most of these employment undulations can be linked to the general health of the national economy or the prospects of a particular business sector. As a staff function, T&D professionals have typically been among the first employees affected when an economic hardship does occur in an organization. In recent years, however, the general employment outlook for the T&D profession has been generally positive. Yet, recent events, such as the economic crisis of the early 1970s, have prompted increased efforts to examine and justify the role of T&D in organizations. For example, a growing body of literature has emerged examining how T&D can be used to help foster organizational renewal and change (Swanson and Gradous 1987) and increase the human capital of individuals in an organization (Carnevale 1983).

Growth of New Professions

Much has been written about the emergence and growth of new professions. Bell (1972) reported that the percentage of professionals in the labor force, of all types, increased from 4 percent in 1900 to 8 percent in 1950 to 13 percent in 1966. He further predicted an increase to 25 percent by the year 2000. Many different occupational groups now claim professional status, including classroom teachers, morticians, public administrators, and real estate appraisers. Public recognition of professional status is varied, but the desirability of such a perception among most groups is consistently high. Recently, some authors have warned, from their various occupational perspectives, that the rush to be a professional will not solve the more basic issues of what professionalism actually entails (Hanford 1986; Rabin 1981-82; Woodring 1986). Regardless, the societal need for new areas of specialized expertise has resulted in many groups seeking to define themselves as having professional status.

Training and development is a prime example of how this emergent process has given birth to numerous, budding occupational endeavors (Skjervheim 1977). The T&D profession is basically practical work that occurs within a large organizational context. It involves taking actions that are intentional and skillful, under conditions that are frequently changeable and problematic. The effectiveness of this work is usually dependent on the commitment and support expressed by upper-level managers and the cooperation provided by supervisors and other line personnel. In this sense, T&D professionals face situations that are similar to those that have been found in most other forms of professional practice--situations that are complex, uncertain, unique, and given to potential value conflict (Schoen 1983).

Features of the T&D Profession

Although universal agreement does not exist on the essential features that identify a profession, most analyses (Houle, Cyphert, and Boggs 1987; Larson 1977; Vollmer and Mills 1966) include the following attributes:

o The existence of a body of knowledge, a set of attitudes, and a group of skills that enable persons to perform a particular service

o An extended period of specialized study and training to learn the methods of service and develop skill in their use

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o A program of professional preparation that is appropriate for inclusion in the offerings of a university, combining theory and practice

o An organization of members who act collectively to maintain and improve professional services and promote high professional conduct and ethical practice

o A commitment to serving the needs of people and quality of service rather than monetary profit as ultimate measures of achievement and success

It is just recently that these basic criteria can be applied to T&D, though still to a varying degree of success. The focus of the present discussion is on three of the five criteria listed: (1) specialized areas of knowledge and skill, (2) intensive preparation requisite for practice, and (3) conformity to ethical and technical standards. One additional criterion, implications of preparing professionals through university programs, is discussed as a separate issue later in this monograph.

In terms of identifying distinct areas of knowledge and skill in T&D, at least two major competency studies have done much to advance this issue. These studies share the following three features that allow for a greater degree of confidence in their findings: (1) all were conducted with a national focus, (2) all included the perspectives of broad segments of the T&D profession, and (3) all used a defensible and rigorous inquiry process. The *Models for Excellence* (McLagan 1983) study was supported by the American Society for Training and Development (ASTD) and led to the identification of 15 distinct job roles and respective clusters of knowledge and skill that support each job role. The ASTD study defined a job role as "a set of work activities within a job with a common purpose which transcends specific jobs. It has a core identity within a field or profession" (p. 130). These T&D job roles are as follows:

o Evaluator

o Group facilitator

o Development counselor

o Instructional writer

o Instructor

o Manager

o Marketer

o Media specialist

o Needs analyst

o Program administrator

o Program designer

o Strategist

o Task analyst

o Theoretician

o Transfer agent

The second study, *Instructional Design Competencies: The Standards* (Foshay, Silt , and Westgaard 1986), focused specifically on one T&D job role, instructional/training designer, and

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presented performance conditions and standards for their measurement. Exhibit 1 lists the 16 competencies related to this job role (Bratton 1983). These competency statements are intended to serve as the standards for the independent certification of instructional/training design specialists. Although some in the profession have raised questions and concerns about the comprehensiveness of these two competency studies, T&D professionals are increasingly able to point to a documented body of knowledge and skills on which their practice is based.

In terms of intensive preparation for the T&D profession, there has been a dramatic increase in the number of academic programs, particularly at the graduate level, that prepare persons for a variety of training and development job roles (McCollough 1981). This increased university interest has been prompted, in part, by student demand to prepare for the profession. As such, training and development has been a particularly attractive career option for those persons already employed in a helping profession, for example, teachers, psychologist, and social workers. The competency studies have made curriculum planning easier and less risky for those university faculty not having extensive experience in the profession (Pace, Peterson, and Porter 1986).

The competency studies have also allowed academic departments to target specific T&D job roles of interest. Thus, for example, a job-role target for industrial education, instructional technology, or vocational education departments could be the program designer job role, whereas a business administration department could target the human resource manager job role. Variation from these examples across different institutions and departments, however, seems more often the rule than the exception.

Like most other professions, T&D professionals have found conformity to ethical and technical standards the most difficult professional criterion to address (Bowie 1985; Swindle, Phelps, and Broussard 1987). Though problematic in many respects, the objective demonstration of competence of an established body of knowledge and skills is a critical aspect for achieving the respect granted to the more established professions, such as medicine, law, and psychology. In each instance, these professions are regulated through examinations administered through respected national associations and state licensing boards. Yet, even these regulations are not sufficient to address the issues of competency and acceptable codes of conduct for individuals in those professions (Marie 1986).

In comparison, training and development is a relatively young profession where the issues of standards and ethics are still emerging. In general, attention to these issues is not a pervasive concern among T&D professionals. This is understandable since the profession is just now receiving some degree of recognition and identity. Most current efforts to address the issues of ethics and technical standards in the T&D profession are being addressed through the professional certification efforts. It has been proposed that an acceptable certification plan could confirm the professional status of T&D and help set standards for professional behavior (Galbraith and Gilley 1986). Acceptance of a viable certification plan for all professional T&D job roles, however, remains a concern for many. One area of major concern has been the various measurement issues related to certification, such as instrumentation, reliability, and validity (Shrock and Foshay 1984).

In spite of these and other related issues, T&D has arguably emerged as a distinct professional endeavor, though certainly not with the same tradition and degree of acceptance granted to the more established professions. Regardless, in comparison to other emerging, specialized professions, T&D has moved steadily toward meeting the basic criteria for professional status and should be accorded that recognition.

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EXHIBIT 1

COMPETENCIES FOR THE INSTRUCTIONAL/TRAINING
DEVELOPMENT PROFESSIONAL

1. Determine projects appropriate for instructional development.
2. Conduct needs assessments.
3. Assess learner/trainee characteristics.
4. Analyze the structural characteristics of jobs, tasks, and content.
5. Write statements of learner outcomes.
6. Analyze the characteristics of a setting (learning environment).
7. Sequence learner outcomes.
8. Specify instructional strategies.
9. Sequence learner activities.
10. Determine instructional resources appropriate to instructional activities.
11. Evaluate instruction/training.
12. Create course, training package, and workshop management systems.
13. Plan and monitor instructional design projects.
14. Communicate effectively in visual, oral, and written form.
15. Interact effectively with other people.
16. Promote the use of instructional design.

SOURCE: Adapted from Foshay, Silber, and Westgaard (1986)

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HUMAN PERFORMANCE TECHNOLOGY

This section presents an overview and description of the field and then proposes a formal goal and definition of the field.

Overview of the Field: A Systems Perspective

The goal of the human performance technology field is to use systems approaches to ensure that the right individuals have the knowledge, skills, motivation, and environmental supports to do their jobs effectively and efficiently. Effectiveness refers to getting people to produce accomplishments that are of value to the organization and to the individual. Efficiency refers to producing those accomplishments in a manner that requires the least amount of time, resources, and costs. The field can be used by T&D professionals to solve performance problems in existing systems or avoid anticipated problems in planned systems. The conceptual domain of human performance technology can be defined by three key aspects: (1) functions to manage the development of human performance systems or other management functions. (2) functions to develop human performance systems, and (3) the components of human performance systems. Together, these aspects allow for a formal definition to be presented. Human performance technology is the development of human performance systems and the management of that development, using a systems approach to achieve organizational and individual goals.

The field has been formulated from the research of several behavioral and organizational theorists during the past 25 years or so, among whom were Thomas Gilbert, George Odiorne, Robert Mager, and Robert Gagne. Much of the specific theoretical development about the field was generated during the mid-1960s by researchers at the Training Systems Institute at the Bureau of Industrial Relations, University of Michigan. In essence, these individuals interpreted existing knowledge in several diverse areas, including general systems theory, communications, learning psychology, management science, and economics, and applied them to issues involving the human side of work. From this effort, a unique, organized body of knowledge began to emerge.

Although several authors deserve mention for their influence on the field, any overview must recognize the work and influence of Thomas Gilbert. Much of the current literature can be linked, either directly or indirectly, to the four theorems Gilbert (1978) presented in his book, *Human Competence*, and the discussions presented in his earlier writings (Gilbert 1967, 1974). In these writings, Gilbert has been able to synthesize the various bodies of contributing knowledge into a logical, integrated statement about a systems approach for improving human and organizational performance. It should be noted that little of his writings is empirical in nature; rather, most of it is written in commentary form, based on the research of others and anecdotal reports of his own experiences as a consultant.

Using Gilbert's work and a few additional references to describe human performance technology can be somewhat problematic. To some interpretations (Mager 1978), Gilbert's original intent was to explicate a set of behavioral engineering principles, not necessarily to provide a theoretical

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framework for a profession. Yet, more and more T&D professionals view human performance technology as being important in guiding them in their professional practices (Zigon 1986). Results of using aspects of the field have been reported in a number of scholarly journals, such as *Performance and Instruction, the Journal of Instructional Development,* and the *Journal of Industrial Teacher Education.* The National Society for Performance and Instruction (NSPI), an international professional organization of approximately 6,000 members, recently celebrated its 25th anniversary dedicated to the furtherance of the field. Members of the society are primarily students, practitioners, and researchers from the T&D profession.

Another concern is that the range of authors and research literature pertinent to the field remains limited. This concern has lessened somewhat with the recent publication of *Introduction to Performance Technology* (Smith 1986), a volume containing the works of 20 authors addressing various issues and activities related to the field. This volume is one of the first scholarly references to consider the field as a unified entity. Human performance technology is still an incomplete field. Much work remains in defining the precise nature of the features that make it unique.

Description of the Field

Any description of the human performance technology field must consider the many interrelated themes and issues involved. To account for this, the following subject headings are meant to serve as springboards for discussion, allowing a set of propositions about the field to emerge. The end result should provide a comprehensive description of the major aspects of the field.

Human Performance and Human Behavior

Of initial importance to the field is the distinction made between human performance and human behavior. Human performance is defined as the documented outcomes, including the products and processes, that result from human behavior. Human performance and human behavior are not the same, though behavior is logically a necessary part of performance. Human behavior is a precondition for performance. According to Gilbert (1978), human performance is the valued accomplishments or achievements that result from human behavior. Nickols (1977) defined human performance as "the outcomes of behavior. Behavior is individual activity whereas the outcomes of behavior are the ways in which the behaving individual's environment is somehow different as a result of his or her behavior" (p. 14). Thus, human performance technology proposes that human behavior and performance are different, and that knowledge of these differences is important for achieving the goals of the field.

Understanding human performance is important since the field addresses some basic questions about it: What type of performance requires changing? and Who is doing that performance? To answer these questions, present and desired levels of human performance must be measured and the costs associated with them must be calculated. Exhibit 2 presents three classes of human performance and their related components. Upon review, it can be recognized that human performance is a condition of the individual in relation to other individuals in a group or organizational setting. As a result, values placed on these accomplishments are, to a great extent, influenced by the goals and expectations expressed by others surrounding the individual. It is extremely difficult, therefore, to separate individual human performance from that of organizational performance. Thus, human performance technology proposes that any statement about human performance is at least as much about organizational success and performance as well.

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EXHIBIT 2

THREE CLASSES AND REQUIREMENTS OF HUMAN PERFORMANCE

1. **Quality**

   - **Accuracy.** The degree to which an accomplishment matches a model.

   - **Class.** The comparative superiority of one accomplishment over another based upon market value, judgment points, physical measures, and opinion ratings.

   - **Novelty.** The uniqueness of the accomplishment.

   - **Combinations.** The combination of more than one quality class.

2. **Quantity (or Productivity)**

   - **Rate.** The number of items or pieces produced within a specific time period.

   - **Timeliness.** The completion of an accomplishment within a specified time limit.

   - **Volume.** The amount of the accomplishment, but is not rate or time dependent.

3. **Cost**

   - **Labor.** The amount expended on labor to make an accomplishment.

   - **Material.** The material costs required to make an accomplishment.

   - **Management.** The managerial and administrative costs associated with an accomplishment.

SOURCE: Adapted from Gilbert (1978)

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Worthy Human Performance

Human performance technology proposes that the costs of improving performance be considered as investments in human capital, which yield returns valued by the organization and individuals in terms of increased performance potential. Acquiring knowledge and skills that have no value is a waste of time, resources, and money. Gilbert (1978) presented a theoretical framework for achieving *worthy* human performance, which is the ratio of the value of the accomplishment to the cost of the behavior to attain that accomplishment. He stated that worthy human performance should be the ultimate focus of all "individuals who make human competence their business" (p. vi). This ratio can be expressed as follows:

$$\text{Worthy Performance} = \frac{Value\ of\ Performance}{Costs\ to\ Achieve\ Performance}$$

In general, therefore, worthy performance is when we are able to get individuals to produce accomplishments that exceed the costs of achieving those accomplishments. Thus, competent humans are those who can contribute valuable results without generating excessive costs. From this, the T&D professional can apply this equation by replacing value and costs with measures of exemplary and typical performance, respectively. Using this approach in practice, a performance improvement potential (PIP) can be calculated for competing problem areas. The one with the greatest potential for improved performance should provide the highest returns to the organization. A smaller PIP ratio indicates a lower amount of return, because of the lower potential for improvement.

Determining what is worthy performance is one of the most controversial aspects of the field. Human performance technology tends to encourage a top-down approach in that worthy performance is determined mostly with the values of the organization in mind. Individual values are considered, but only within the context of what is good for the larger entity. Tosti and O'Brien (1979) stated that it is incumbent upon the T&D professional to distinguish what individuals value before selecting rewards for the performance outcomes expected by the organization. Stolovitch (1982) stated that those organizations that have high productivity and quality are the same organizations in which employees have high morale, self-esteem, and satisfaction. Stolovitch further stated: "It is not axiomatic that what is good for the company is necessarily evil for the employees. Excellent performance often translates into greater security, improved salaries, and an overall high level of interest and satisfaction in one's employment" (p. 18).

In spite of this, much remains to be understood about the match of values expressed by the organization and individual worker. Issues of employee motivation, satisfaction, and labor-union involvement require further research attention. The importance of these issues for human performance technology cannot be overly emphasized. As such, any determination about what is worthy performance must be broad enough to encompass the values of all perspectives in the organization. It is proposed, therefore, that any description of human performance technology must explicitly recognize the role of organizational goals as well as appropriate individual goals.

Domain of the Field

As presented in table 1, there are three major implications of systems theory for human performance technology that, in turn, form the proposed conceptual domain of the field: (1) functions to manage the development of human performance systems or other management functions, (2) functions to develop human performance systems, and (3) the various components of human performance systems.

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TABLE 1

DOMAIN OF HUMAN PERFORMANCE TECHNOLOGY

	Management Functions	Development Functions	Systems Components
Purpose	To guide, control, and facilitate the development of human performance systems and to ensure their effective continued operation	To examine all aspects of a problem, relate results from a set of decisions to other decisions, and use resources optimally to develop performance systems	To provide a conceptual means to view the people, materials, events, resources, and tools that are required to achieve individual and organizational goals in work settings

Components	• Administrative
	  — Departmental mission
	  — Goals
	  — Coordination of tasks
	  — Philosophy
	  — Budgeting
	  — Policies
	  — Programs
	
	• Personnel
	  — Staff selection
	  — Task assignments
	  — Supervision
	  — Staff feedback/appraisal
	  — Personnel development
		• Determine problems, needs, goals
		• Analyze present/desired performance
		• Analyze jobs, tasks, and people
		• Analyze supporting systems
		• Develop tentative solutions
		• Revise and improve solutions
		• Implement and disseminate final solution
		• Evaluate all aspects of the system
		• Conduct research and develop new knowledge about the technology
			• Job context
			• Abilities, motivation, behavior of persons
			• Responses required for performance
			• Consequences of the performance
			• Feedback on the consequences

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Management functions are required to develop human performance systems and manage other support functions. The goals of systems management functions are to guide, control, and facilitate the development of human performance systems and to ensure their effective continuous operation (Silber 1970). Specifically, performance systems management requires attention to managing the administrative aspects surrounding human performance systems (policies, goals, coordination, philosophy) and managing the personnel who are involved in the tasks required to develop and maintain human performance systems (staff selection, task assignment, supervision, performance feedback). Specific T&D job roles that pertain to the management functions include training managers, project managers, or program developers.

Use of systems approaches to develop human performance systems is one of 'he most prominent aspects of the field. Systems approaches are goal-oriented management tools that allow the problem solver to examine all aspects of a problem, to relate the effects of one set of decisions to another, and to use optimally the resources at hand to solve the problem. Systems approaches vary from simple conceptual models to very complex specifications of step-by-step approaches. A simple graphical definition of a systems approach appears as follows:

Analyze ——————> Develop ——————> Evaluate
| |
| |
|_____ Revise _____|
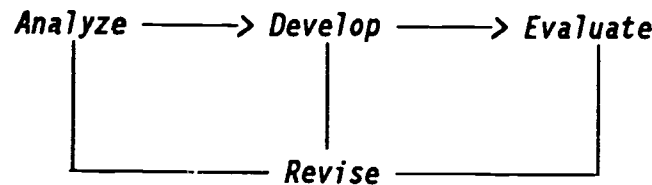
Regardless of the simplicity or complexity of a model, all systems approaches provide a set of guiding principles used to solve problems. Phases of a complete systems approach include the following:

o Determine problems, needs, and goals

o Analyze present/desired performance

o Analyze jobs, tasks, and people

o Analyze supporting systems

o Develop tentative solutions

o Implement solutions

o Revise and improve solutions

o Implement and disseminate final solution

o Evaluate all aspects of the system

o Conduct research and develop new knowledge

Human performance technology represents the use of a number of different systems approaches, depending upon the problem of interest and the professional activity required. For example, if instruction or training has been selected as the appropriate solution to a performance problem, then a program developer would use an instructional design model to guide the development of that outcome. Andrews and Goodson (1980) provided a comprehensive comparison of 40 different instruction design models. Other types of solutions require the use of other specific systems approaches, including models for needs assessment (Kaufman and Stone 1983), front-end analysis (Harless 1975), and organizational redesign (Rummler 1986). No one systems approach defines the

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field. Instead, all systems approaches contribute in some way to the end result of developing human performance systems.
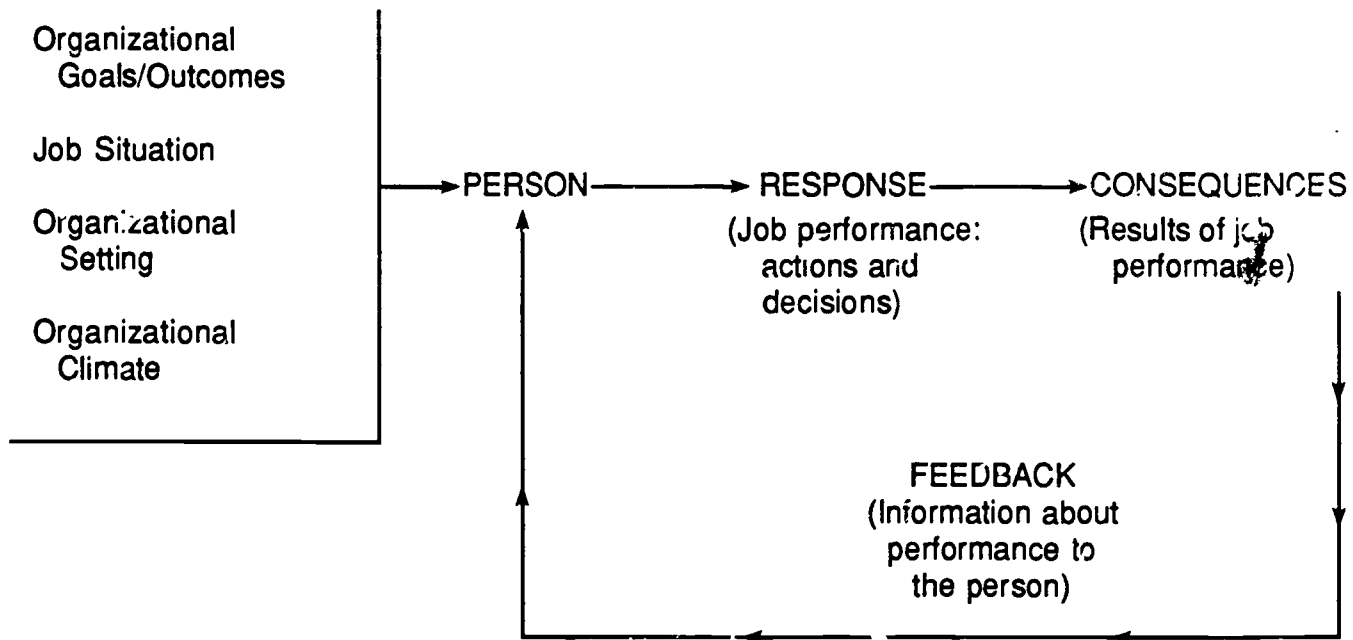
Clearly, the application of systems approaches may lead to a number of different outcomes. In terms of human performance technology, the end result of using a systems approach is a combina- tion of materials, events, people, and strategies, called a performance system. A performance system is the structure, within the work setting, in which people use resources and tools to per- form their work. According to the precepts of a systems approach, performance systems must be intentionally designed and have gone through a revision process such that it has a demonstrated capability of producing a desired result for a given set of performers. A performance system is an abstract phenomenon, but it has much usefulness in depicting the interrelatedness of people and their environment in work settings.

As shown in figure 2, all human performance systems have five major components: (1) a job or context that guides performance; (2) the abilities, motivation, actions, decisions, and behaviors of the person; (3) the responses of the person that are required for performance; (4) the conse- quences to the performance after making the response; and (5) the feedback on the consequences. That is, given any job, there is a context composed of values, goals, work setting, organizational climate, and structure requiring a person to make a response or behave in some manner, which results in a consequence to the person. Depending on the values held by the person, the conse- quence may be perceived to be positive, negative, or have little value at all. Information about that consequence is then directed back to the person and becomes another part of the job context, influencing subsequent job behaviors.

Perspective of the Field

Consistent with the perspective of most other applied fields of study, human performance technology is linked more closely to the perspective of engineering than to basic science. Gilbert (1978) has been one of the strongest voices in making this point. He stated that one of the assumptions of engineering is that much useful knowledge exists that can be formulated into reliable and replicable technologies for solving practical problems. The perspective of science, on the other hand, is more useful in generating new knowledge that may be applied later by engi- neers and technologists. Both perspectives represent legitimate views depending on the purpose at hand and the role of the professional. Confounding this distinction somewhat is that technologies must generate their own bodies of knowledge. As a result, a science of technology usually emerges to support that techr 'ogy, creating new knowledge that is purposeful and useful.

Human performance technology is about engineering human performance. Thus, the technologies involved are based on what is *known* about the principles to change the outcomes of behavior, not necessarily the behavior itself. Attempting to understand human behavior, isolated from first considering human performance, moves us away from that engineering perspective. Human behavior can be attributed to many factors, such as motives and feelings, most of which are hidden within the individual and, thus, difficult to measure and change. On the other hand, human performance is manifested outwardly, making an objective assessment of its nature much easier. Human perfor- mance technology proposes that knowing how to engineer human performance, and the conditions that affect it, is more important than attempting to explain why certain human behaviors have occurred (Nickols 1986).

Organizational
   Goals/Outcomes

Job Situation

Organizational
   Setting

Organizational
   Climate

PERSON ──────→ RESPONSE ──────→ CONSEQUENCES

                (Job performance: (Results of job
                 actions and   performance)
                 decisions)

                       FEEDBACK
                 (Information about
                   performance to
                     the person)

SOURCE: Adapted from Rummler (1978)

Figure 2. A human performance system

In the course of their existence, organizations may experience many types of problems. Organizational problems are typically complex, having many interacting influences and causes. For example, an organizational problem can, at the same time, have causes linked to financial, equipment, and human sources. Distinguishing the exact extent of the human component of the problem in relationship to the other interrelated parts of the setting is especially difficult. Simply put, however, human performance problems exist when people, for whatever reason, commit some type of human error, the consequences of which can be immediate (for example, a nuclear operator responding incorrectly to a visual cue on a panel) or delayed (for example, not replacing a bolt on a commercial jet during maintenance). In either case, the occurrence of human error may indicate that a performance problem exists, likely involving many other aspects of the organization.

Knowing about performance problems and determining their causes is uppermost in importance to solving those problems. Discussions about problems usually lead to the conclusion that human performance technology is solely diagnostic or remedial in nature. Yet, human performance technology is equally suited to avoiding performance problems. Considering both the remedial and preventive aspects, human performance problems can be formally defined as when some aspect of the present performance system, or some anticipated aspect in a planned performance system, does not function as desired. We are made aware of the presence of a performance problem by the human errors that appear as a result. Performance problems can be associated with all levels of workers, management and hourly (Jacobs 1986).

Theoretically, performance problems can be diagnosed and avoided through use of an ideal performance system. An ideal performance system must provide clear and relevant guides to performance; the persons who are expected to perform must have the ability and willingness to do so; the performance standards and resources must be available; the appropriate incentives must be provided; and relevant and frequent feedback must be provided about the adequacy of the performance. Human performance technology proposes that to diagnose existing problems, one should analyze the present performance system and then examine the differences between it and an ideal system. To avoid anticipated performance problems, one should analyze the planned performance system and modify it to approximate the ideal system.

Systems approaches used to guide the definition of performance problems are variously labeled as needs assessment, needs analysis, performance analysis, or front-end analysis (Harless 1975; Kaufman 1986). Generally, needs *assessment* models are differentiated from needs *analysis* models by their scope and relative level of abstraction. Needs assessment models tend to be more inclusive in scope, focusing on identifying all possible problems, concerns, or issues that may confront an organization. Causal analysis is frequently part of most needs assessment models (Kaufman and Stone 1983). Needs analysis models tend to be more specific in intent, focusing on one or more identified problem areas. Needs analysis determines whether the identified problem is, in fact, a performance problem, identifies the root causes of the performance problem, and suggests means to solve the performance problem. The Front-End Analysis model (Harless 1975), as summarized in exhibit 3, is representative of many needs analysis models.

When analyzing performance problems, goals are derived from documented needs. According to Odiorne (1986), in referring to the work of Herbert Simon and his colleagues (Simon and Newell 1958), goals seek to do any of three things: (1) to transform situation a into situation b, (2) to eliminate or reduce the difference between a and b, and (3) to help apply a program or method to a. The first type of goal is a transformational goal in that the character of the present situation would be transformed into an entirely new situation. The second type is an elimination goal, where a deviation from the present state to a norm or standard is proposed. The

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EXHIBIT 3

FRONT-END ANALYSIS MODEL

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1. Narrow the problem area
   - Gather indicators, symptoms, effects
   - Group by similarity

2. Describe the problem
   - Describe mastery and actual
   - Compare the two
   - Describe the deviation

3. Hypothesize causes
   - Lack of skills/knowledge
   - Environmental deficiency
   - Motivational-incentive deficiency

4. Test each hypothesis
   - Gather evidence for/against each
   - Describe causes

5. Describe solution alternatives
   - Training
   - Nontraining

6. Select best alternative

SOURCE: Harless (1978)

third goal is dependent upon the nature of the present state of situation a and what b should be like in the future.

Both transformation and elimination goals are represented in the field of human performance technology, though the elimination type seems more prevalent when actual practice is considered. Some authors such as Mager (1975) have promoted the use of elimination goals to define the field, as these goals seem easier to operationalize and measure, for example, the goal of reducing the error rate of workers to a standard. Elimination goals, however, also tend to be more short-term in nature and narrower in scope. Other authors (Kaufman 1986; Odiorne 1986) view transformational goals as having importance greater than or equal to elimination goals for the field, for example, the goal of determining how the product and customer reactions will differ if the error rate is reduced to a standard. To these authors, transformational goals seem to have a preordinate relationship to elimination goals, stating that transformational goals are more akin to achieving strategic goals, which elimination goals are designed to help accomplish.

Given these differences, however, performance problems and needs share a logical relationship with both types of goals. Goals must be identified by first analyzing the present condition and then comparing it to some more desirable condition, regardless of its specific nature. The deviation between the present and desired situation defines what is meant by a need. A need is a description of the measured difference between two levels of human performance, in other words, the difference between "what is and what should be." Goals are statements that define the level at which the performance problem can said to be solved. In actual practice, the use of transformational or elimination goals seems mitigated by the access granted to the T&D professional and how clearly the desired performance condition can be described.

Role of Exemplary Performance

Much discussion exists in the social science literature about the process and criteria used for establishing job performance standards (Dunnette 1966; Macy and Mirvis 1983; Odiorne 1984). Many different perspectives to these issues have been represented, each differing primarily by their technical adequacy and practicality. Common with other human resource specialists, T&D professionals have some influence over how this process is conducted and which criteria are selected. Specific to T&D professionals, however, is how this information is used. Knowledge and use of job performance standards is a necessary part of several professional activities for T&D professionals, including (1) helping determine whether a performance problem actually exists, (2) specifying goals, and (3) assessing gains in performance improvement. These activities require the use of job performance standards that are realistic, attainable, and measurable. As such, human performance technology proposes that exemplary performance provides the most logical referent for determining job performance standards.

Gilbert (1978) defined exemplary performance as "the worth of the historically best instance of the performance" (p. 30). It is assumed that exemplary performers, or master performers, will always exist in any goal-oriented setting. Exemplary performers can accomplish, either through their extended work experiences or some special capabilities, more worthy levels of performance than other performers. Exemplary performance serves as a benchmark for those performing the same work at relatively lower levels of performance, or typical performers. Typical performance represents the average performance level, or the present unacceptable performance level, that exists in the performance system. Exemplary performance can be represented in terms of the procedures, processes, troubleshooting skills, and subject-matter areas known by expert performers (Swanson and Gradous 1986).

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In actual practice, identifying exemplary performance can be a lengthy, and sometimes frustrating, experience. Exemplary performance can seldom be represented by analyzing the performance of any one person or group. More likely, exemplary performance represents a composite picture generated from many different exemplary performers and stakeholders. Often, aspects of this composite performance picture have, in fact, never actually occurred. Rather, exemplary performance describes an image of what desired performance levels should be like. Problems usually arise when the T&D professional attempts to synthesize these data into a single statement describing exemplary performance, all the while encouraging consensus and agreement from all the individuals involved. Disagreements are bound to occur at this point. It is often realized, however, that exemplary performance must be considered a dynamic phenomenon, changing frequently as the conception of what constitutes exemplary performance becomes better understood over time.

Once identified, knowledge of exemplary performance has much practical value for T&D professionals. Human performance technology makes the optimistic assumption that given an ideal performance system, all performers can achieve, or can approach the levels of, exemplary performance. Thus, the general focus of any performance improvement activity is to consider the best possible performance that is occurring in that system, analyze the reasons why some individuals cannot reach those levels, and then provide the necessary means that will lessen the gap between exemplary and typical performance.

Causes of Human Performance Problems

Determining causality in the behavioral sciences is accompanied by much uncertainty. Blanshard (1962) illustrated this point when discussing the causes of malaria. Is the cause actually the mosquito bite, or the plasmodia that are transmitted during the bite, or the reaction of the plasmodia with human red corpuscles? There is no absolute certainty for acquiring the disease under any of these conditions. At best, a causal inference can be made that if a person is bitten by an anopheles mosquito, then he or she will most likely contract malaria. These two events form a principle that, given certain conditions, has a high though not perfect chance of occurring.

Concerns about causality in human performance technology are focused more on establishing reliable behavioral principles and less on explaining why the principle exists. A principle is a statement of relationship between two or more sets of varying conditions. Considering the preceding example, therefore, one successful way to avoid malaria is to rid the area of mosquitoes. The principle here can be simply stated: if mosquitoes are eliminated, then people will not contract malaria. This principle informs the public health professional exactly what has to be done to maintain a disease-free environment.

In the same way, indicators of a performance problem can be matched against a set of causes that have been proven to be related to those indicators. We hypothesize that in each new specific case, the general principle will remain valid. From a theoretical sense, performance problems and symptoms are one and the same because, when the symptoms are removed, we infer that the performance problem has been solved. Thus, in order to describe the cause of a performance problem, we are basically limited to defining the cause in terms of what it will take to solve the problem. In figure 3, Rummler (1972) illustrated this logic by showing that certain symptoms are related to certain classes of solutions. For example, if the symptom is that tasks are not being done to the desired standard, then the class of solution involves improving feedback, inferring that the performance problem involved a lack of feedback to the performer.

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Symptoms	Class of Solutions

1. Tasks are not being done to the desired standard.

2. Desired performance gradually deteriorates over time.

3. Employees don't believe it is necessary to perform as desired.

    Improve or provide feedback

4. Work is seldom done on time.

5. There is a backlog of work.

6. Work is done, but seldom well.

    Redesign the job

7. Tasks are not being done at all.

8. Employees do the task when first on the job, but their performance deteriorates after a short time.

9. Employees do the job correctly only when a supervisor or other authority figure is present.

10. Employees appear to be lazy or not motivated.

    Change the consequences

SOURCE: Adapted from Rummler (1972)

Figure 3. Symptoms and classes of solutions

Human performance technology proposes that performance problems can have different root causes and that these causes are generally classified as either originating from within the performer, from something in the performer's environment, or from both. Gilbert (1978) proposed his Behavioral Engineering Model (BEM) as an analytic tool for identifying performance problems and their causes. The model discriminates between the external environment and the person as the two interacting areas that must be analyzed. Thus, environment (E) and person (P) make one axis of the analytic matrix. The other axis is divided into three main categories of causes of performance problems:

1. **Information** includes the data in the environment and the skills and knowledge the person has to possess in order to use the data.

2. **Instrumentation** includes the resources available, the design of the work, tools in the environment, and the capacities of the person for using these objects in the environment.

3. **Motivation** includes the incentives/rewards in the environment and the person's motives and expectations while performing the job.

As presented in table 2, the model poses questions about the problem causes within each of the six cells. The general sequence of the cells describes the relative frequency of problem causes. Thus, improper guidance and feedback in the environment are usually the largest contributors to performance problems in the world of work, whereas a person's motives are relatively the least contributors. In general, the environmental variables provide the most powerful strategies for change and are the least costly to implement. Though little empirical evidence is available to support this assertion, most other authors show agreement on the general accuracy of this point.

Of note here is the relative position of a lack of skill/knowledge in the BEM. Historically, T&D professionals have primarily viewed their role as solving performance problems within this area. It may seem paradoxical at first that the field of study that most closely supports the T&D profession also views this cause as relatively lower in importance and power. If the Behavioral Engineering Model is an accurate depiction of the causes of performance problems, and if the T&D profession is about the solution of performance problems regardless of their cause, then it seems obvious that T&D professionals must have the vision and capability to solve a wide array of problems.

Other authors have presented similar schemes for identifying causes of performance problems. Harless (1975) collapsed the six cells from the Behavioral Engineering Model into three of the most frequently occurring problem causes: lack of skill or knowledge, lack of motivation or incentive, and lack of some supporting aspect in the environment. Harless suggested the typical performance indicators for each of the cause categories, as summarized in table 3. Herem (1979) distinguished performance causes in five categories:

o Organizational constraints

o Environmental constraints

o Person/job mismatch

o Undeveloped competencies

o Incompatible attitudes

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TABLE 2

BEHAVIORAL ENGINEERING MODEL

	Information	Instrumentation	Motivation
Environmental supports	**Data** 1. Relevant and frequent feedback about the adequacy of performance 2. Descriptions of what is expected of performance 3. Clear and relevant guides to adequate performance	**Instruments** 1. Tools and materials of work designed scientifically to match human factors	**Incentives** 1. Adequate financial incentives made contingent upon performance 2. Nonmonetary incentives made available 3. Career development
Person's repertory of behavior	**Knowledge** 1. Scientifically designed training that matches the requirements of exemplary performance	**Capacity** 1. Flexible scheduling of performance to match peak capacity 2. Physical shaping 3. Adaptation 4. Selection	**Motives** 1. Assessment of people's motives to work 2. Recruitment of people to match the realities of the situation

SOURCE: Adapted from Gilbert (1978)

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TABLE 3

CAUSES OF PERFORMANCE PROBLEMS

Suspect a lack of SKILL/KNOWLEDGE when:

1. Target population is new to task.

2. Target population is generally low level in skills and knowledge (and there is no history of M-I problems).

3. Population has had no formal training in the task.

4. History of inadequate training capability in the organization.

5. Training has been massed rather than distributed.

6. No opportunity to practice skills while in training.

7. Training is lock-step (group paced) as opposed to more individualized.

8. Deficient task is branched (alternate routes) rather than linear (straight sequenced).

9. Decision making is involved in the task.

10. Task requires application of principles.

11. Performers cannot perform correctly even though they know they are being observed (or know their jobs depend on it.)

SOURCE: Harless (1978)

Suspect a lack in the ENVIRONMENT when:

1. There has been a history of:
   a. Deadlines not being met.
   b. Frequent management turnover.
   c. Greatly fluctuating profit and loss statements.
   d. Supply and demand difficulties.
   e. Duplication of effort.

2. There is no clear-cut chain of command or work flow.

3. Personnel are forced to "wear many hats."

4. Grumbling is widespread.

5. Personnel have no alternative tasks to do while waiting on the product of some other person.

6. Frequent appearance of personnel "not having anything to do."

7. Troubles with machines, lack of supplies, and so on.

Suspect a lack of MOTIVATION or INCENTIVE when:

1. The deficient task is distasteful or socially negative.

2. The employee is unaware of the value of the products produced.

3. There is strong disagreement about the method that should be employed in performing the task.

4. The effort involved in performing the task is greater than the reward received.

5. Punishment is employed as a management technique.

6. There is a history of documented M-I problems.

7. Personnel do not get feedback on their work.

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Both Rummler (1972) and Mager and Pipe (1970) separated causes into two general categories: deficiencies of execution and deficiencies of knowledge. Deficiencies of knowledge exist when the person does not have the skills or knowledge to perform as expected. Deficiencies of execution exist when a person has the skills or knowledge to perform, but lacks feedback about the performance, experiences task interference, or receives unfavorable consequences for performing a task appropriately. Mager and Pipe (1970) developed a well-known decision aid that summarizes the identification of problem causes.

Perceptions can differ widely about where the performance problem is actually located and who is responsible for causing it to occur. When organizational problems arise, accusatory fingers tend to point in every direction: production managers blame the field salespersons for incomplete orders, sales blames production and the warehouse for delays, warehouse managers view themselves as having to cover for the errors of others, and so on. In reality, human performance problems seldom originate from or remain isolated in one part of an organization or among one group of employees, for example, hourly workers, supervisors, or managers. Instead, performance problems occur within a chain of events among interconnected groups of individuals, making the location where the problem was first noticed unlikely to be the same location where the problem was caused. Performance problems are typically systemic in nature.

Human performance technology proposes that the performance of one subsystem affects the performance of other subsystems in somewhat predictable ways, requiring that problem causes be analyzed from more than one level of the organization. As such, most authors propose that the source of performance problems usually originates from the organizational level just above where the problem is first perceived to exist. In practice, responsibility is usually placed at the level of management, since those persons have more direct control in changing the performance system. A scheme that operationalizes how to locate and diagnose human performance within organizations is the Performance Matrix (Gilbert 1978). The scheme is considered a matrix because it contains six hierarchically ordered organizational levels, each level having three stages: accomplishment models, measures by which to determine if those accomplishments have been reached, and typical methods of performance improvement used at that level. In practice, however, most attention is placed at three of the levels: policy, strategic, and tactical, as presented in table 4. These levels correspond to the organizational areas of department or division, job, and task, respectively.

The performance matrix can be used to troubleshoot performance problems by analyzing the accomplishment models and performance measures for each level, starting from the most general level possible and then moving downward. Starting from this point, such as the policy level, allows the T&D professional to ask the question: What policy decisions must be made if good strategies and tactics can be developed? Questions about problem causes are posed at each level as derived from the Behavioral Engineering Model. Of special importance is the need to identify or establish a mission statement for the organization, usually at the policy level. If the overall guiding mission can be determined, then it is much easier to describe the accomplishments at the remaining subordinate levels. Pinpointing the location and responsibility of a problem cause becomes much like a conventional troubleshooting exercise--progressively moving from general to specific. Gilbert developed the acronym ACORN as criteria for describing the mission of an organization:

o **A**ccomplishments or performance of the organization

o Is **C**ontrol provided to those who are responsible for performance?

o Is the statement an **O**verall objective, and not a sub-goal?

o Can the mission be **R**econciled with the other goals of the organization?

o Can a **N**umber be placed on the accomplishment?

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TABLE 4

POLICY, STRATEGY, AND TACTICS LEVELS OF THE PERFORMANCE MATRIX

Stages / Levels	Accomplishment Models	Measures of Opportunity	Methods of Improvement
Policy (Department or division levels)	1. Cultural goal of the organization 2. Major missions 3. Exemplary standards	1. Performance measures 2. PIPs 3. Stakes 4. Critical roles	1. Environmental programs (data/tools/incentives) 2. People programs (knowledge/selection/recruiting) 3. Management programs (organization/resources/standards)
Strategy (Job level)	1. Mission of job 2. Major responsibilities 3. Requirements and units 4. Exemplary standards	1. Performance measures 2. PIPs 3. Critical responsibilities	1. Data systems 2. Training designs 3. Incentive schedules 4. Human factors 5. Selection systems 6. Recruitment systems
Tactics (Task level)	1. Responsibilities of tasks 2. Major duties 3. Requirements and units 4. Exemplary standards	1. Performance measures or observations 2. PIPs 3. Specific deficiencies 4. Cost of programs	1. Feedback 2. Guidance 3. Training 4. Reinforcement

SOURCE: Adapted from Gilbert (1978)

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In spite of some lengthy guides on this topic, determining the causes, precise location, and responsibility of human performance problems remains more of an art form than a technology. Professional practice would be served by having a larger literature base in this area.

General Classes of Solutions

There are five general classes of solutions relevant to human performance technology:

o Training

o Job performance aids

o Feedback systems

o Employee selection

o Organization redesign

Given the complexity of most human performance problems, these solutions are seldom used in isolation. More frequently, solutions are used in some creative combination to address different causes of the larger problem. Table 5 presents a description, goal, types of performance problems addressed, and specific examples for each of the five general classes of interventions.

Solutions are considered the means to achieve prespecified performance outcomes. In the course of professional practice, however, solutions are often misconstrued as representing the outcome itself. Instead, solutions are only enabling outcomes designed ultimately to make possible more effective and efficient human performance systems. Most T&D professionals concentrate their efforts on becoming skillful in developing only a few types of solutions. This seems appropriate given the complexity of knowledge and skills required to develop each class of solution. However, T&D professionals must maintain clarity that solutions are merely a means to an end and that no one solution has inherently more power to solve problems than another. Having the skills to analyze the problem and identify which solutions are most appropriate for that problem is a more universal skill required for all T&D professionals.

When one solution is overly emphasized, T&D professionals sometimes fall victim to the "law of the hammer," which refers to the axiom that, if a child is given a toy hammer, then he or she will likely use it to pound on everything in the play environment. In the same way, T&D professionals who become enamored of the appeal of any one method or medium, for example, group discussions or interactive video, usually find a way to reconstruct all problems such that the solution includes their favorite. Human performance technology proposes that the selection of any one solution is dependent upon the cause and nature of the performance problem and that the criteria used to evaluate a solution must include its potential to make a measurable difference in the performance system. Determining whether a performance problem has been eliminated must occur in the work setting, not in the training classroom.

Goal and Definition of the Field

Combining the preceding discussion, the following goal and definition of the human performance technology field can be proposed:

o **Goal.** To use systems approaches to ensure that the right individuals have the knowledge, skills, motivation, and environmental supports to do their jobs effectively and efficiently.

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TABLE 5

SOLUTIONS RELEVANT TO HUMAN PERFORMANCE TECHNOLOGY

Descriptions Solutions	Definition	Goal	Type(s) of Problems Addressed	Products/Activities
Training	A structured set of learning experiences and methods to present the knowledge, skills, and attitudes required for use on-the-job.	To increase the probability that the person can recall from memory the critical knowledge, skills, and attitudes critical for effective job performance	• Lack of skill, knowledge, or attitude.	• Self-instructional modules • Group discussions • Role-playing sessions • Lectures
Job Performance Aids	A structured set of materials, resources, and equipment that stores information external to the user and guides the performance of work (Harless 1986).	To guide all types of human performance on the job.	• Lack of skills, knowledge, and attitudes. • Lack of tools in the environment.	• Checklists • Decision aids • Samples
Feedback Systems	Information provided to the performer either to provide a summative evaluation of performance or improve performance (Tosti 1986).	To affect the quality and quantity of performance.	• Lack of data in the environment.	• Coaching sessions • Production wall charts • Memoranda • Team meetings • Quality circles • Performance appraisals • Customer surveys
Employee Selection	The process of selecting the most appropriate persons for jobs based on a description of the specific functions that must be performed, an analysis of the performance requirements to do the job, and a determination of the selection criteria that must be used at the time of hiring (Leibler and Parkman, 1986).	To prevent performance problems and reduce their associated costs.	• Lack of a person's capacity to perform some aspect of a job.	• Job descriptions based upon performance models • Selection criteria required for job performance
Organization Redesign	The process of changing the assigned goals, responsibilities, and reporting relationships within a given organization (Rummler 1978).	To improve the organization's ability to provide a better product or service and to use resources with greater efficiency.	• Lack of data, instruments, and incentives within systems of the organization.	• Change reporting relationships • Improve data sharing • Define or change job responsibilities • Change goals and standards for functions • Understand systems flow of work

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o **Definition.** Human performance technology is the development of human performance systems, and the management of that development, using systems approaches to achieve organizational and individual goals.

Several additional definitions of human performance technology have been offered in the literature, though no one definition has received widespread acceptance. Most current definitions, however, have some degree of similarity. Thiagarajan (1987) reported three basic ideas that define the field: (1) the domain of human performance technology is the improvement of human and organizational performance; (2) human performance technology emphasizes the use of systematic processes that involve analyzing problems and needs, specifying performance goals, selecting and implementing strategies, and assessing the effectiveness of the strategies; and (3) unsatisfactory human performance can have many causes, requiring the use of a variety of solutions.

From the literature, the following definitions have been suggested:

o A cornerstone of performance technology is outcome signification--discovering valid, useful performance objectives and stating them in terms that are easily understood (Ainsworth 1979, p. 5).

o Performance technology is concerned with measurable performance and the structuring of elements within the system to improve performance (Stolovitch 1982, p. 16).

o Performance technology is, therefore, a field of endeavor that seeks to bring about changes to a system in such a way that the system is improved in terms of the achievements it values (Stolovitch 1982, p. 16).

o Human performance technology is the process of selection, analysis, design, development, implementation, and evaluation of programs to influence human behavior and accomplishment most cost-effectively (Harless, as cited in Geis 1986, p. 1).

o The technology involves the following key activities:

--determining needs
--analyzing performance (e.g., task analysis)
--developing tentative solutions
--trying out draft solutions
--revising the draft solutions on the basis of evaluation
--measuring success, usually in terms of criterion-referenced measures (Geis 1986, p. 3).

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IMPLICATIONS

Implications of the proposals should have relevance in two areas related to T&D: professional practice and academic programs.

Professional Practice

The reality of contemporary organizations is complexity, change, and upheaval. Thus, the implications of using human performance technology are mediated by the types of performance problems encountered, the internal conditions of the organization, and external economic and social pressures on the organization. Many T&D professionals may find that their practice settings are unwilling to submit to the intensity of systems analysis as suggested by the field. Possibly for the first time, the T&D professional must make decisions based on certain organizational data, such as absenteeism rates, production data, and product costs, and seek out that data from company accountants and personnel managers. In almost all cases, T&D professionals must balance professional survival against good professional practices. Use of human performance technology does not make a person's job easier; in reality it adds more complexity, challenges, and risks. The issues of power and influence sometimes overwhelm good problem solving, requiring much political savvy on the part of the T&D professional.

The following brief scenario may help illustrate some implications of human performance technology in professional practice. The vice president of manufacturing in a medium-sized company sent a memorandum with the following request to the training manager: "Many of our hourly employees seem to lack interest in doing their jobs well. Would you please develop a training program for my supervisors that would present good motivational techniques to use with their subordinates."

In this scenario, one approach might be to respond by assessing the basic reasoning of the request as presented by the vice president, and then quite possibly agree from that point to develop the course. Several meetings might be called to determine the nature of the content and the specific motivation techniques that should be included. The obvious result of this response would be a training program, designed and implemented to the specifications of the vice president. The training manager may have provided an important service to the organization and the supervisors and may have even "won over" the vice president to the value of the training department, but there is no certainty that the problem has been solved. It is even possible that this approach could be effective. For example, supervisors could use the techniques and employees could respond by having renewed interest in their work. Even so, any assessment of this approach would mostly be subjective in nature.

An alternative approach by the training manager would be to follow a different route in responding to the request--one that is more consistent with a systems approach. This alternate approach would call for the training manager to respond by asking a series of general questions to help clarify whether the vice president really had a particular solution in mind (training) and

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obtain more information about the perceived problem that would require the use of motivation techniques. The training manager might also request that further analysis be conducted in the problem setting "to make certain that our resources will be used in the best way possible."

The result of this initial questioning and subsequent analysis might result in the form of a report, as presented in the following example:

Organizational goals state that we have a need to decrease product defects from 30 percent to 15 percent. Our analysis reveals that all hourly employees have the skills to make an acceptable product, but they appear to lack structured, objective feedback about their performance. Supervisors have not been providing feedback to their subordinates in a structured manner because this has not been a part of their jobs and they lack the skills to do so now. Two general solutions are advised: a training program for the supervisors and a feedback system for the hourly employees. We will know when the problem has been solved when the defect rate is 15 percent or lower, when at least 90 percent of hourly employees report favorable opinions about their feedback sessions with supervisors, and when supervisors have scheduled at least two individual feedback sessions per month with each employee for 6 consecutive months.

Note that in this hypothetical case study, the systems approach used in the second response has operationalized the original request from a lack of "interest" to a lack of feedback. Obviously, interest describes behavior, not performance. Lack of feedback was hypothesized and confirmed as being the cause since performance had been acceptable at one time, the work design had not changed, no feedback was provided in the present performance system, and an unacceptably high defect rate was noted. Deducing from this evidence allowed the consideration of the following principle: if feedback is lacking in the performance system, and if no other reason precludes the lack of feedback, then performance will deteriorate over time.

Note also that more than one solution was used to address different aspects of the problem: a training program for supervisors to address their lack of skill and knowledge and a feedback system for hourly employees to address their lack of feedback. Other solutions could have been selected for the case study. For example, the analysis could have shown that hourly employees did not have the basic skills to do the job or they experienced task interference. Thus, the solutions could have been the establishment of more precise selection criteria or organization redesign, respectively. Defect rate standards were established by determining the lowest monthly defect rate recorded within the past 6 months and then obtaining management agreement on that rate. Standards for the supervisors were determined by interviewing the manager (who was at one time an exemplary supervisor), present supervisors, and experienced employees.

Further implications on professional practice are summarized in table 6. From Boothe (1985), a "traditional" approach and a systems approach to professional practices are compared along eight dimensions. A traditional approach may be defined as when the mission of the T&D department is primarily the design, delivery, and management of training programs.

The essence of the comparison is that by using a systems approach, the goals that govern the activities of the T&D professional become more congruent with that of the organization. The success, worth, and security of T&D professionals depend, to a large extent, on their effects on the organization's bottom line. Bottom line results could be defined in many ways depending on what is most highly valued by the organization and individuals: more profits, better products, better services, or greater external recognition.

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TABLE 6

COMPARING APPROACHES TO T&D

	Traditional Approach	Systems Approach
Sample Mission Statement of T&D Department	To provide all types of training support services to all employees	To assist in increasing the effectiveness and efficiency of all individuals and the organization
Measures of Success	• Hours of training • Persons trained • Classes delivered • Media produced • Instructional objectives accomplished • Course catalogs	• Job behaviors • Job performance • Problems solved • Cost savings to organization • Product quantity • Product quality • Lower absenteeism • Lower turnover • Plus some measures in the Traditional Approach
Origin of Performance Problems	Problems are brought to the T&D department. Staff then responds based upon time and perceived importance of person bringing the problem. Less time for problem solving, as much time is devoted to delivering courses from training catalog, e.g., "Introduction to	Problems are brought to the T&D department or T&D department anticipates problems from own independent analysis of projected personnel needs using forecasting methods. More time for problem solving since fewer training courses are delivered on a scheduled basis.
Audiences Served	All audiences of the organization served though distinctions are made for administrative reasons to separate T&D departments concerning technical-skills training, supervisory training, and management development.	All audiences of the organization served, fewer distinctions are made to separate audiences served, recognizing the interrelatedness of performance problems.
Relationship with Organizational Goals	T&D is a support function often referred to as a cost center as opposed to a profit center. Little relationship with organizational goals.	T&D is a proactive function, generating profits to the organization by documenting savings related to related to reduction in waste, turnover, defects, downtime. High relationship with organizational goals.
Perception of Others	T&D is the department that will provide training programs, schedule and organize special programs, review appropriateness of vendor programs.	T&D is the department that helps other departments analyze their problems and help solve them using training and nontraining solutions. Plus special programs if they are consistent with goals.

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TABLE 6—Continued

	Traditional Approach	Systems Approach
Staff Skills Required	• Deliver training • Lesson plans • Media production • Department budgeting • Course scheduling • Coordinating events • Develop surveys, questionnaires	• Consulting • Needs assessment • Needs analysis • Data collection • Systems design • Long range planning • Cost-benefit analysis • Evaluation • Research • Plus most of Traditional Approach
Potential for Survival in Difficult Times	T&D department is one of the first to be eliminated. T&D is considered a "nice to have" for the benefit of employees.	T&D department may be eliminated, but chances of survival are generally as good as the organization as a whole. T&D is considered essential to maintain market competitiveness.

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If changes in the T&D profession are to occur, then the academic programs that prepare those professionals must be in the forefront of promoting change. The importance of this role seems intensified given the growth in the number of faculty groups adapting existing curricula or establishing new curricula in T&D (McCollough 1981). Many of these efforts have been conducted by faculty from the academic areas of adult, career, or vocational education. Implications of the field for academic programs are based on the experience of the author and colleagues while developing a graduate specialization in T&D during the past 3 years at the Ohio State University. Implications can be presented as follows:

1. If human performance technology is to be considered as the appropriate field of study for the T&D profession, then the purpose statement and curriculum aims of T&D academic programs must be consistent with the demands of the profession and the rigor of the field.

2. Coursework and other academic experiences must be based on a set of core competencies consistent with the profession and the field. For example, graduate coursework must include how to design training programs as well as other solutions relevant to T&D professionals. A proposed set of competencies is presented in exhibit 4.

3. A unique theoretical base must exist to support T&D programs; the preferred base as presented here is human performance technology. The systems components of human performance technology form the major organizer for T&D curricula.

4. As such, a rationale for developing a T&D graduate program must be primarily based on the need to study the field of study, human performance technology, rather than that of a program that prepares student for the T&D profession. This may seem contradictory to the major theme of this report, but many different graduate programs may lay claim to being able to place their graduates in T&D. Only one program should be about the field of human performance technology.

5. T&D programs must focus on specific T&D job roles. As presented, there are a wide variety of T&D job roles. Practically no one graduate program can provide sufficient options to address the competencies required for all. Yet, the theoretical framework that supports all T&D job roles remain the same.

6. A major component of all T&D programs must be a structured practicum experience. The practicum must occur near the conclusion of the student's coursework. A pre-professional experience has the following goals: to provide a setting to apply and practice skills related to specific T&D job roles and to begin the student's understanding of the relationship of theory and practice.

7. Research efforts in T&D must include variables drawn from the domain of human performance technology. Research in the field is critical for its continued growth.

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EXHIBIT 4

PROPOSED COMPETENCIES OF THE T&D PROFESSIONAL

1. Identify organizational needs.

2. Analyze indicators, causes, and costs of human error.

3. Conduct job and task analyses.

4. Specify job performance standards.

5. Select appropriate T&D solutions.

6. Design instructional methods and media.

7. Construct nontraining job performance aids.

8. Specify/implement appropriate motivational, job redesign, and environmental solutions.

9. Control and ensure the quality of T&D projects.

10. Assess the effectiveness of performance systems.

11 Maintain credible and collaborative consulting relationships.

12. Consider oneself as a member of a helping profession.

13. Understand/perform research related to the improvement of professional practices in T&D.

14. Engage in professional and self-development activities.

15. Promote the understanding/use of models and practices related to the improvement of human and organizational performance.

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PROPOSITIONS OF HUMAN PERFORMANCE TECHNOLOGY

From the discussions of human performance technology, a set of 11 major propositions have emerged. These propositions, in turn, encapsulate the general characteristics of the field from which further theoretical development and empirical research can be derived. The propositions are presented as follows:

1. Human performance and human behavior are different, and knowledge of the differences is important for achieving the goal of the field.

2. Any statement about human performance is at least about organizational performance as well.

3. Costs of improving performance should be regarded as investments in human capital, yielding returns in terms of increased performance potential.

4. Organizational goals as well as individual goals must be considered to define worthy performance.

5. The domain of human performance technology consists of management functions, development functions, and systems components.

6. Knowing how to engineer human performance and the conditions that affect it is as important as explaining why the behavior occurred.

7. To diagnose problems, one should analyze the present system and then examine the differences between it and an ideal system. To avoid anticipated problems, one should analyze the planned system and modify it to approximate an ideal system.

8. Exemplary performance provides the most logical referent for determining job performance standards.

9. Human performance problems can have different root causes, and these causes are generally classified as either originating from the person, from something in the person's environment, or from both.

10. Performance of one subsystem affects the performance of other subsystems in somewhat predictable ways, requiring that problem causes be analyzed at more than one level of an organization.

11. Many different solutions may be used to improve human performance. Selection of any one solution is dependent upon the cause and nature of the performance problem, and the criteria used to evaluate a solution must include its potential to make a measurable difference in the performance system.

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CONCLUSIONS

This monograph proposes that the systems-based field, human performance technology, is a unique body of knowledge appropriate to support and guide the professional practice of T&D professionals. Human performance technology is basically concerned with solving human and organizational performance problems in work settings. The field is much like several other systems-based problem-solving models, but it is unique in a number of important ways. Eleven propositions have been presented to help describe the unique characteristics of the field.

The overall thrust of this report has been about change. Change seems to be the force prompting organizations and nations to seek new and better ways of doing things. Societal changes have generated a need for specially prepared professionals to help make the change process occur more smoothly and justly. T&D professionals are unique helping professionals. Their focus is on helping people improve their performance, yet their work involves the use of all aspects of the work environment and system to make those improvements occur. They do this to help the organization and the individuals involved achieve important goals. No other professional has precisely this defined role.

The overall aim of this report was not to answer all the important questions about the T&D profession and the field. Instead, by proposing human performance technology as the field of study for the T&D profession, new questions can be generated and a dialogue achieved among all those who have a stake in the T&D profession, particularly among adult, career, and vocational educators.

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