Assessing Training Needs: Critical Levels of Analysis

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Advancements in personnel research are likely when the concepts and theoretical perspectives of organizational psychology are integrated into the concepts and perspectives of the personnel literature (Schneider & Smither, 1986). The personnel research-related area of training has been particularly singled out as being faddish and technique oriented, with little concern for the development of theories (Goldstein, 1986; Hinchliff, 1978; Moore & Dutton, 1978). Hinchliff (1976) concludes that the content and emphasis of training may have changed, but the way in which training is developed and evaluated has evolved very little.

The focus of this chapter is on the assessment of training needs, since this step provides critical input into the development and evaluation of training programs. It is our contention that the emerging literature in organizational psychology on levels of analysis issues (Roberts, Holton, & Rousseau, 1978; Rousseau, 1985) provides a theoretical framework for viewing the analysis of training needs. The levels perspective focuses training

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Researchers acknowledge the importance of understanding relationships among characteristics of organizations, groups, and individuals. The integration of levels of analysis provides a framework for research on organizational issues.

This chapter is divided into four sections. First, the literature on training needs assessment is reviewed and criticized. Second, the levels of analysis perspective is introduced. Third, a conceptual model of training needs assessment, which incorporates levels issues within the traditional concepts of needs assessment, is presented. The fourth section presents additional research directions for conducting needs assessment, as well as practical guidelines for conducting needs assessment from the levels perspective.

Training Needs Assessment

There is little disagreement among training researchers (for example, Bass & Vaughan, 1966; Goldstein, 1986; Megibee & Drayer, 1981) that a thorough assessment of the organization's needs is of utmost importance and should be conducted before the development of a training program. Training needs assessment provides information on where training is needed, what the content of the training should be, and who within the organization needs training in certain kinds of skills and knowledge (Weeks, 1984). In this section, McGee and Drayer's (1981) framework, which has structured the needs assessment literature, is reviewed, and the need for a new and expanded theoretical perspective on training needs assessment is addressed.

Framework for Training Needs Assessment. McGee and Drayer (1981) introduce a framework for understanding the needs assessment process. It identifies three critical and interrelated components: organizational analysis, operations (or task) analysis, and person analysis. Organizational analysis emphasizes the study of the entire organization, its objectives, its resources, and the allocation of those resources, as they are related to the organizational objectives (McGee & Drayer, 1981). It involves the examination of a number of factors, such as efficiency indexes and productivity records, to determine the extent to which organizational goals are being met. An assessment must also be performed to determine whether training is a viable strategy for accomplishing organizational goals.

Once an organizational analysis has been conducted to identify where training is needed (for example, in a department or a work group), a task analysis determines the activities performed on the job and the conditions under which the job is done (Goldstein, 1986). Information is often collected regarding the knowledge and skills needed for effectiveness on the job.

A person analysis focuses on determining which employees need training and what kinds of training are required (McGee & Drayer, 1981). This step involves the determination of how well employees are doing their jobs, through such measures as performance evaluation and job knowledge tests. When individuals perform below standard levels, analysis must be conducted to determine whether training will be the solution to the performance problems.

The framework developed by McGee and Drayer (1981) has been the major contributor to the ordering of the complex problems that surround training needs assessment. The framework has been praised as the most comprehensive and sophisticated one for considering training needs (Weeks, 1984). Moore and Button (1978) use the framework to categorize the various techniques employed for determining training needs. Recent reviews of the training literature have used the framework for organizing and discussing the needs assessment literature (Goldstein, 1986; Weeks, 1984).

A New Perspective. It has been over twenty-five years since the introduction of the tripartite system for identifying training needs. Since then, the needs assessment literature in the training area has focused on the expansion, formalization, and creation of specific techniques for data collection (Moore & Button, 1978). Consequently, organizational, task, and person...
analyzers can best be viewed as descriptive labels for groups of related data-collection methods. Rather than as a conceptual framework that drives research on training needs assessment, the lack of conceptual development in the needs assessment literature has persisted despite McGeebe and Thayer's (1961) caveat that their framework is only one of many possible approaches to understanding training needs analysis.

Training researchers and analysts have implicitly acknowledged the importance of incorporating both macro (organizational) and micro (group and individual) perspectives into training research (Goldstein, 1986; Moore & Botton, 1978). For example, Hirsch (1976) conceptualizes the training system as existing on three levels: those of the individual, the training department, and the organization. Of more specific relevance to needs assessment issues is McGeebe and Thayer's (1961) contention that individual and organizational goals may be the results of inadequate skills, insufficient knowledge, or inappropriate attitudes. McGeebe and Thayer also state that the examination of organizational climate must begin with the "unity" level of the company and continue through the departmental and divisional levels, until an adequate picture of the training situation emerges. Moore and Botton (1978) suggest that research on training needs has focused mainly on the individual as the relevant unit of analysis and has ignored work groups and internal group processes.

The notion of multiple levels of analysis is implicit in training research, but it has been given explicit consideration (Hemsley & Markham, 1987). Failure to recognize levels of analysis concepts explicitly can result in confusion, misinterpretation of data, and inefficiency in utilizing resources. In fact, a more rigorous and scientific consideration of levels of analysis issues has been cited as essential to the advancement of social science (Mosholiher & Bedicen, 1983; Roberts, Holin, & Roughan, 1978; Roughan, 1985)

Over the last decade, the levels of analysis literature has expanded, and the concepts underlying that approach have been clarified. Explicit use of the levels perspective on training needs analysis can lead to advances, both in the conceptual and

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in the operational domain. This perspective also reflects more adequately the complexity and the structuring of the training function and of the organization. In the next section, we briefly review the important components of the levels perspective that are most relevant to the development of a new theoretical perspective for training needs assessment.

Components of the Levels-of-Analysis Perspective

The levels of analysis perspective is an extension of the general systems paradigm. It posits that events should be viewed within their larger contexts; it is impossible to understand complex events by reducing them to their individual elements (von Bertalanffy, 1978, 1980). Any particular system must be viewed as a subsystem of some still larger system (Lewin, 1951). The systems are seen as interrelated, such that the properties of the system and its components are changed if the system is disassembled in any way (Atkinson & Huber, 1987).

These general assumptions form the basic elements of the levels perspective. In building a research model from the levels perspective, several steps need to be taken. First, the system being studied must be decomposed into subsystems or levels. Second, the conceptual variables of interest must be identified for each level of analysis. Third, operational measures of the conceptual variables of interest must be specified for each level. Finally, information gathered on the relationships among variables in the model must be interpreted at the appropriate level(s) of analysis.

Identification of Levels. A paradox of the general systems paradigm is that the notion of systems' interrelatedness makes it impossible to test any models, since nothing can be separated from the larger system (James, Mednick, & Brett, 1982). From the levels perspective, a system is viewed as nearly decomposable (Simon, 1953), which means that it can be divided into relatively independent subsystems, or levels, yet maintain the original system's characteristics. Interactions among subsystems are viewed as weak but not negligible. Therefore, while mechanisms
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At any particular level, one can study relatively autonomous functions within the hierarchical system. Interactions among levels are also important considerations.

Vertical differentiation of levels is also possible, because the time processes at any given level differ from those at other levels. Higher-level processes are said to have slower time scales than lower-level processes (Simonton, 1967). Mesarovic, Macko, & Takahara, 1970). Adjacent levels are more similar in time scales for processes than are levels that are farther apart.

From the levels perspective, hierarchical structure allows for the vertical separation of hierarchical levels (Roussouf, 1960). Organizational researchers typically have used the terms organizational, unit, and individual to denote the hierarchical ordering of organizational levels. For example, Indik, 1960). The organizational level refers to the entire system, without reference to specific individuals or groups. The unit level is a subunit of a formal work group in the organization, without consideration of individual workers. The individual level refers to a single person in a group.

Conceptualization. The levels perspective requires the specification of constructs for each level (organizational, unit, and individual). Over the course of interest, consideration must be given to the development of theories that specify how the constructs or variables are related within and across levels. The levels issues relevant to the conceptualization of variables include isomorphism, bond strength, cohesion, and the distinctions between parts and wholes.

In developing a conceptual model from the levels perspective, one must consider the functional similarities that exist across levels, and particularly across adjacent levels (Indik, 1968). Simonton (Van Gogh, 1978; Von Bertalanffy, 1956), a basic element of the levels perspective, refers to the generalizability of constructs across levels. That is, there are general characteristics, exhibited by all systems, that represent similar processes in all the systems. Isomorphic constructs have also been labeled "composition models" (see Roussouf, 1965).

For mechanisms to be generalized across levels, the con

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Structural changes in relevant needs must have similar meanings across levels (Roberts, Indik, & Roussouf, 1968). A construct at one level is therefore related to another form of the construct at a different level (Janes, 1980). Functionally similar or isomorphic constructs (for example, goals, tasks, or climate) must be determined independently for each level. Moreover, concepts at higher levels should be defined more broadly than those at lower levels (Mesarovic, Macko, & Takahara, 1970) and may include more elements than a similar concept does at a lower level. As an illustration, the general objectives at the organizational level (for example, "increase quality") must be translated into individual-level objectives that are much more specific ("reduce scrap by 10 percent over the next month").

Relationships among variables can operate at multiple levels simultaneously. Mechanisms at any particular level can be conceptualized as relatively autonomous functions within the hierarchical system, but it is also important to specify interactions among levels. Behavior and relationships across levels can be viewed as bonded together, such that variables at one level may affect or be affected by variables at adjacent levels (Indik, 1965; Roussouf, 1965).

The notion of bond strength (Simonton, 1974) refers to the degree of interaction between components or levels, such that the behavior of one influences another. Bond strength is greatest between systems or levels closest to each other in the hierarchy (Roussouf, 1964). For example, technology at the subunit level has a greater influence on individual task design than does the more general notion of technology at the organizational level.

Consideration must be given to variables that constrain or limit the freedom of an outcome of any component in the system (Fiske, 1970), that is, conceptual models should be developed to specify the variables that may influence or constrain the constructs of interest.

Components can be of two types—extrinsic and intrinsic (Roch & Penfield, 1965). Extrinsic components, often referred to as cross-level effects, reflect the impact that variables or phenomena at one level have on variables at a lower
level for example, the surrounding technology of the work environment constrains both task design and the tasks needed for the performance of individual jobs (Griffin, 1982). Interpretive constraints (sometimes referred to as level-specific effects) represent influences in processes of a single level, such as those found in market and claims or in causal links among variables within a level. An example of an interpretive constraint is an individual's motivation to learn, which affects the acquisition of knowledge.

It is also important to consider theories where levels of analysis are concerned (Damoreau, Althe, & Vanmarie, 1984; Roberts, Hulin, & Rousseau, 1978). Damoreau and his colleagues contend that a distinction must be made between part and whole. In developing theoretical frameworks, researchers must explicitly consider whether they are interested in differences between whole entities (say differences between individuals) or in differences within an entity (say differences in an individual's skill levels across various tasks).

Operationalization. With the levels perspective, once the appropriate constructs have been conceptualized, the operationalization of these variables must be made consistent with the levels on which they were conceptualized. A growing body of literature on empirical procedures for examining research in corporate level studies argue that the levels of analysis issues must be made consistent with the levels on which they were conceptualized. A growing body of literature on empirical procedures for examining research in corporate level studies argue that the levels of analysis issues must be made consistent with the levels on which they were conceptualized.

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The goal of theory refers to the organizational level on which a theory is rooted (Roberts, Hulin, & Rousseau, 1978). From the levels viewpoint, the unit of theory should be defined in terms of observable and measurable constructs (Moshabber & Redican, 1983). For example, a goal that each group should be producing at a certain level represents a group.
another level. For example, in job analysis, incumbents are often asked to rate the importance of the tasks they perform. Responses are then aggregated across individuals, to determine the importance of each task for each job.

Aggregation is often a useful strategy, but inappropriate conclusions may be drawn when constructs are not appropriately measured and are interpreted at levels of analysis to which they are not related. In particular, there is the danger of fallacy, arguing that the unit to which an inference refers is smaller or larger than the unit of theory. This has been termed the “fallacy of the average level” (Mossholder & Bedeian, 1983).

In drawing cross-level inferences, it is crucial to ensure that interpretations drawn from aggregated data represent the unit of theory upon which the construct of interest is based. Aggregations should represent high levels of agreement among perceptions in a common context (Jones & James, 1979) before the aggregated data are interpreted to represent a unit of theory.

Summary of Levels Issues. Table 2.1 presents a summary of the levels of analysis issues relevant to training needs assessment. The system must first be decomposed into its hierarchical levels (organizational, subunit, individual). The relevant constructs are then identified, with attention given to the conceptual issues of isomorphism, bond strength, constraints, and parts versus wholes. Operationalization of these constructs follows, and unit of theory and aggregation are considered. Finally, interpretations are drawn from the operationalizations, with attention paid to cross-level inferences. Throughout this process, it is crucial that variables be conceptualized, measured, and interpreted at appropriate levels of analysis. Careful adherence to levels issues will promote appropriate conclusions about relationships within and across levels.

A Model of Training Needs Assessment from the Levels Perspective

The literature on training needs assessment has traditionally focused on the development of better techniques and methods for improving the quality of information collected about organizational, task, and person analyses. Numerous variables and techniques have been identified, but they have yet to be placed in a theoretical framework. The differentiation of training needs by levels is crucial to understanding training needs assessment, as is the incorporation of any issues of conceptualization, operationalization, and interpretation that are relevant to levels of analysis. This section presents a model of training needs assessment from the levels of analysis perspective. The proposed construct is relevant to this new model of training needs assessment framework. Figure 2.1 presents a model for considering training needs assessment from the levels perspective. The model casts
training needs assessment within a tripartite framework that involves a training content, organizational level, and application.

The first component of the new model is its three context areas: organizational, task, and person analysis. We retain the labels used by McGee and Thayer (1981), because these three content areas are entrenched in the training literature, and more important, they capture the major types of information that can be collected during a training needs assessment.

The second component of the model expands the basic framework of McGee and Thayer by differentiating the three context areas according to organizational, subunit, and individual levels of analysis. It is possible, of course, to identify more than three levels of analysis, but the total depends on the number and types of groups in the organization. For example,

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work groups may be identified as belonging to a lower echelon, and functional departments as belonging to a higher echelon, when the group level is examined as an entity. The environment surrounding the organization can also be considered at another level of analysis. This differentiation makes explicit the notion that a needs assessment must deal with issues at the organizational, subunit, and individual levels of analysis. For example, a task analysis at the organizational level would involve determining the basic tasks performed or technology used by all the people in an organization, while the same analysis at the individual level would focus on the tasks that each individual performs in the organization. A subunit level task analysis would focus on the tasks performed or technology used by each work group.

The third component of the model adds depth by incorporating the issues of conceptualization, operationalization, and interpretation. Constructs relevant to training needs assessment across the three levels and the three context areas (that is, the nine cells in the front face of the twenty-seven cell matrix of the figure) must be identified and defined. In the identification of the constructs, the conceptual issues of homomorphism, bond strength, constraints, and parts versus wholes must be considered. Operationalization concerns the development of measures that adequately tap the constructs of interest for each level and content area (that is, the middle nine cells of the matrix, relevant to the intersection of levels, content, and operationalization). When one is developing measures for use in a training needs assessment, the unit of theory and the aggregation of responses become important considerations. Interpretation is concerned with ensuring that the inferences drawn from a training needs assessment (see the last row of nine cells in the matrix) are consistent with the conceptual definitions and operational measurements, regardless of the level of analysis or context area addressed. In interpreting information from a needs analysis, the appropriateness of cross-level inference must be examined.
variables that involve organizational, task, and person analysis. The model also includes the specification of constraints, operationalizations, and interpretations, which are clearly defined for each organizational level and context area.

Conceptualization and the Identification of Isomorphic Contracts. Figure 2.1 shows that training needs can be more fully delineated when constructs and their relationships are mapped across the three training content areas and the three organizational levels. In developing our typology of training needs constructs, we reviewed the organizational psychology and training literature to identify characteristics relevant to training needs across the three levels of analysis. This section presents a framework that specifies the key organizational contracts for organizational, task, and person analysis. In each of these three content areas, we develop isomorphic contracts for the organization, subunit, and individual levels of analysis.

The needs assessment literature on training has defined organizational analysis as the study of the entire system in terms of its goals, strategies, and performance. The integration of the levels perspective into needs assessment demonstrates how limited a view of organizational analysis this is, since it ignores issues across multiple levels of analysis.

It has been proposed that organizational analysis is composed of two basic dimensions or constructs. One dimension pertains to the examination of organizational goals, objectives, and values, the unit that is the focus of the analysis (Beer, 1964; Goldstein, 1986; McGrath & Thayer, 1961). As in consistent with past research, goals are considered to be sets of constraints that limit an entity's scope of action (Simon, 1964). The other dimension of organizational analysis involves time orientation (Lawrence & Lorsch, 1967; McGrath & Kelley, 1988). The basis of recent work by McGrath and his associates (McGrath & Kelley, 1986; McGrath & Konrad, 1983), we contend that entities (organizations, groups, and individuals) develop different conceptualizations toward time, and that these affect their behavior in organizations.

At the organizational level of analysis, organizations...
be ineffective for enhancing his performance, since he is not motivated to learn the material or to transfer new skills to the job. Instead, strategies to enhance his perceptions of the training programs' value may be needed (see Hark & Rimsza, 1997, for an example of a realistic preview for potential trainees). Moreover, when a subunit has goals beyond or in conflict with organizational goals, and when the subunit's goals are not identified, training will be deficient and ineffective (Goldstein, 1986; Lynton & Pareek, 1967).

Organizations can be differentiated not only in terms of their goals and values but also according to the time frames within which goals and priorities are set. Time, of course, is inherently scarce and immutable (McGrath & Rotchford, 1983); nevertheless, cultures and the organizations within them develop dominant conceptions of time, and these create temporal problems (McGrath & Kiley, 1980). Organizations have to resolve these critical, time-related problems: overcoming conflicts of interest, and scarcity. The solutions to these problems involve the need for scheduling actions, the need for coordinating actions, and the need for allocating time in an efficient and rational way that maximizes organizational goals and priorities (McGrath & Rotchford, 1985). This idea implies that an organization's conception of time may be largely a function of its culture, but how the organization's approaches to scheduling, coordination, and allocation of time may differ. McGrath and Rotchford (1983) assert that these issues are at the heart of organizational efficiency, cost, and productivity; they reflect the organization's goals, purpose, and priorities, as well as its effectiveness in attaining its goals.

At the subunit level of analysis, Lawrence and Lorsch (1967) view time orientation as a key factor that differentiates among departments in an organization. They see time as a span of interval for receiving definitive feedback about the results of work efforts and behavior. For example, sales and production personnel deal with problems that provide rapid feedback about results. Consequently, they tend to focus their attention on short-term matters. By contrast, research and engineering personnel have longer-term concerns, since tangible feedback on their work is often a long-delayed result (Lawrence & Lorsch, 1967).

At the individual level, McGrath and Rotchford (1983) note that anyone who belongs to a large formal organization will share the organization's conception of time, to some degree. Nevertheless, just as subunits may vary from the organization's dominant values, individuals also have different conceptions of time. These conceptions of how work should be scheduled and coordinated, and of how time should be allocated, may result in conflicts between the individual and the subunit or organization to which he or she belongs. These and other conflicts about time can lead to dysfunctional consequences, such as role ambiguity, role conflict, or role overload (McGrath & Rotchford, 1983).

Thus, there is theoretical support for the levels perspective on time orientation. Individuals, subunits, and organizations do not face the same issues in matters of time; the solution to a temporal problem for one entity may constitute a new problem for another. While different organizational levels may not face the same temporal issues, however, they do face the parallel set of issues that involve around scheduling, synchronization, and allocation of time. Therefore, training needs analysis must include examination of how organizations, subunits, and individuals schedule, coordinate, and allocate time, as well as of the effects that these actions have on behavior and performance. For example, role ambiguity, role conflict, and role overload may reflect how time issues are addressed within an organization more than they reflect skill deficiencies that call for individual- or subunit-level training.

Task analysis has been defined in the training literature as the analysis of the job to be performed by a trainee upon completion of a training program. Task analysis may also include analysis of the environmental setting in which the job is done (Goldstein, 1986). Here, we propose that the two constructs relevant to task analysis across levels of analysis are the technical environment and situational constraints.

These exist much confusion about the conceptualization and operationalization of technology (Stauffer, 1970), but most
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Researchers agree that technology can be viewed as techniques used to transform inputs into outputs on a predictable basis (Hage & Aiken, 1969; Rousseau, 1983; Scott, 1975; Streum & Sims, 1986). For the purposes of this chapter, we define technical environments as the processes through which physical and informational inputs are transformed into outputs (see Katz & Kahn, 1978).

Rousseau (1983) makes explicit the notion that technology exists and should be studied at three organizational levels, with attention focused on isomorphic constructs and the development of composite models. At the organizational level, the focus is on the modular or most typical processes used to perform work (the predominant technology of the organization). For example, the modular technology of a manufacturing firm may be routine and long-linked (Thompson, 1967). Moreover, large firms may employ multiple types of technical processes. Rousseau (1983) argues, in such cases, for the examination of the organization's core conversion-process technology (that is, the technology that directly yields a product or service) and of the support technologies that aid it (that is, supply and quality assurance).

Departments and work groups in an organization have technologies that differ from the core technology of the firm. Studies have found that subunits can be differentiated in terms of work flow and technical processes (Lynch, 1974; Overton, Schneck, & Haaslett, 1976). Subunit technology is also qualitatively different from the individual jobs that each unit contains, since subunit technology reflects the characteristics of individual jobs as well as the interactions among jobs (Rousseau, 1983). For example, Comstock and Scott (1977) find that aggregated measures of individual tasks can be distinguished from subunit-level technology in terms of work flow. Thus, subunit technology is not simply the aggregation of the tasks from individual jobs within the subunit.

At the individual level, the technical process concerns individual jobs. The focus is on describing a job (including its equipment and surrounding conditions). The tasks performed (to the knowledge, skills, abilities, and other personal character...)

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...characteristics, required for the job) are the fundamental unit of analysis.

The research on task analysis reported in the training literature has typically focused on the individual level of analysis, aggregating responses to task inventories to provide comprehensive analysis of particular jobs or clusters of jobs (see Ford & Winten, 1984; Goldstein, Macer, & Peters, 1983). Training researchers have tended to ignore the subunit and organizational levels of analysis. By simply aggregating tasks, however, training analysis may miss important aspects of subunit or organizational technology, which in turn will be neglected in the design of training programs. From the levels perspective, the interaction and coordination of tasks must be identified at the subunit (or organizational) level. For example, a task analysis at the subunit level would identify not only the people with whom individuals interact but also the informational requirements of those interactions and the skills required for effective interaction within and across work units.

The second construct identified for a task analysis, situational constraints, we define as the work setting characteristics that directly affect organizational, subunit, or individual performance. A variety of factors can affect work performance. Peters and O'Connor (1986) highlight eight such factors: adequate job-related information, tools and equipment, materials and supplies, financial and budgetary support, services and help from others, personal preparation through education, training, or experience, availability of necessary time, and physical comfort and conditions necessary for doing the job. These factors have been found to hinder or otherwise affect individual performance (Peters, O'Connor, & Kohler, 1985).

At the individual level, willingness and ability to perform may not necessarily lead to success, because of situational constraints (Campbell & Pritchard, 1976; Schneider, 1978). Empirical evidence supports the idea that situational constraints beyond the individual's control hinder task performance (see Peters, Fisher, & O'Connor, 1982; Peters, O'Connor, & Rudolf, 1980). Situational constraints may also lead an individual to...
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modify how a task is completed, so as to minimize the impact of constraints.

The same situational constraints are readily observed at the subunit or organizational level. At the subunit level, work group norms are an additional situational factor that may constrain the performance of the group's members (Hickman, 1976). Norms may also affect what tasks are completed by which members of the work group. At the organizational level, organizations can be differentiated in terms of the degree to which situational constraints affect organizational effectiveness. For example, Rousseau (1983) contends that various input factors (such as the availability of resources, materials, supplies, and information) affect the technological transformation process, which in turn has an effect on output characteristics (such as the number of unique and innovative products or services provided by an organization).

In training research, some situational constraints (often called the conditions under which work is performed) are identified for individuals and different job tasks. A typology of situational constraints (Peters & O'Connor, 1980) provides a framework for systematic study of task analysis across levels of analysis. For example, managers are often asked to assess their own and others' skills across a variety of managerial areas, to determine training needs (see Lord & Neve, 1987). Since the lack of training and experience is only one of many possible constraints, researchers may want to ask managers about the extent to which skill or other constraints are likely to lead to significant changes in job performance. Training can then focus on areas that are due to skill and experience, rather than focusing on other factors. For example, a performance deficiency may not be due to inadequate skills; rather, it may be the result of inadequate budgetary support or of a poor physical environment. Similar analysis can differentiate work groups that require training from work groups that require other interventions to improve their performance.

In training needs research, person analysis focuses on the individual's knowledge, skills, abilities, motivations, and attitudes. From the person perspective, we view person analysis as involving two major constructs: skills and climate. Like the traditional approach to person analysis, the first construct concerns an inventory of knowledge, skills, abilities, and motivations. The levels approach diverges from the traditional approach, however, in that this skills inventory must also be taken at the organizational and subunit levels.

One type of skills inventory at the organizational and subunit level of analysis has been called "human resource analysis" (for example, see McGhee & Thayer, 1981). A human resource analysis describes the current skills of workers and projects what skills will be needed in the future. This analysis also involves projection of the type of positions that will be needed in the future. Analysis of the adequacy of current and projected skill levels for the organization can help in understanding training needs.

An assessment of the organization's and its units' overall performance is also important. Such an assessment can include efficiency indexes on profitability, growth, and productivity measures. The identification of a training need, the organization's overall performance, and the Adequacy of current and projected skill levels for the organization can help in understanding training needs.

The levels perspective explicitly incorporates the idea that organizations and subunits can be differentiated in terms of the skills mix of their employees (Mann, 1965). For example, one company may employ a number of skilled and professional employees, while another company that manufactures a similar product may rely more on unskilled labor. The effects of the skill mix on the use of training as a solution to performance problems has not been addressed.

Typically, person analysis (for example, Klimontz, 1982) that focuses on the individual level. An individual's knowledge and skills are assessed and compared to some standard of performance. Discrepancy between the assessed skills and the criterion of success calls for an examination of whether training could reduce the discrepancy. Training researchers have not conducted person analyses across levels of analysis and have...
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ignored its implications for training. For example, subunits may differ in skill levels, and this situation may call for different types of training programs (say, a refresher course for one subunit, and more basic training for another).

The second construct of person analysis is climate, which focuses on the attitudinal or perceptual component of person analysis, across multiple levels. From the levels perspective, the climate is defined as a set of attributes that can be perceived about the work unit. A number of dimensions of climate can be studied, but one basic dimension of overall climate is the quality and style of interpersonal relations (impartial, supportive, warm, open, or stressful) among work group members (Posey, Lawler, & Hackman, 1975). Such perceptions, because they may have major impacts on people's reactions to events in an organization, may affect their behavior and performance.

From the levels perspective, organizations can be differentiated by the climates that develop in them. For example, one marketing firm may have a highly participative, supportive management style; another has a highly centralized, high-pressure management style. The climate that develops may affect how the organization views its human resources. In fact, recent work at the organizational level of analysis (that is, work on organizational strategy) indicates that some industries are more oriented toward developing human resources than others are (Schuler & Jackson, 1987). Thus, the basic orientation of an organization may affect how it views the importance of training and development versus other strategies (e.g., selection or retraining) for enhancing organizational effectiveness.

Lawrence and Lorsch (1967) believe that organizational subunits are also differentiated by the kinds of interpersonal relationships found among their members. They suggest that, to be effective, subunits should develop interpersonal orientations that are related to the nature of particular tasks. For example, production subunits with high time pressure and highly routinized tasks may foster a style of interpersonal relations (impartial and stressful) different from the style found in research and development departments, which deal with longer term projects and perform fairly unstructured tasks. Conflicts in an organization may be partly due to the different climates that exist in different units.

At another level of analysis, individuals differ in their perceptions of and reactions to events that occur in subunits. People's reactions can affect their attitudes toward their subunits and ultimately can affect their relationships with other members of their subunits (Schneider, 1985). Thus, an individual in the "out group" may perceive the climate of a subunit differently and interpret events in a different way from an individual in the "in group."

The levels perspective implies that climates differ according to whether organizations are oriented toward training and development or toward other types of solutions to their problems. The training literature has ignored issues at this level of analysis and has typically measured organizational climate only to ensure that the work environment will accept changes in the behavior of trainees. While this issue is important, the levels perspective also implies that support for new skills should be examined across levels. For example, it is important to consider whether a particular training program (say, training in participative management skills for subunits that are oriented toward developing people) may be successful in one subunit but unsuccessful in others, where the climate may not be so supportive. For such unsupportive subunits, other interventions may have to precede training.

Operational and Interpretational Issues. The foregoing discussion has identified key constructs and interactive variables for the three content areas of organizational, task, and person analysis and for the three levels of analysis. The key constructs constitute an organizing framework for understanding training needs assessment.

The next step is to develop or identify relevant measures for each of the constructs in the framework. This step, which is beyond the scope of this chapter, is certainly complex; industrial and organizational psychology is still struggling with operationalization across levels of analysis. Nevertheless, when collecting and interpreting data, one should remember that there is no
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single unit of analysis that is appropriate for the measurement of all constructs. Measures, as well as the interpretations devised from them, should be consistent with the unit of theory for each construct.

Specification beforehand of appropriate units of theory, analysis, and interpretation is rarely provided in needs assessment research. Consequently, there has generally been a lack of correspondence between the conceptual and operational variables from each of the three content areas. Since the individual typically has been chosen as the relevant unit of analysis for the three content areas (Moore & Dunton, 1978), researchers have failed to consider whether the unit of theory, the unit of measurement, and the inferences drawn from these measures are all congruent. The potential impact of this situation on the quality of training programs—that is, poor design due to use of the wrong kind of analysis—has not been explored.

Consider the cell of Figure 2.1 defined by the level of the submit, the context of task analysis, and the operational application. One approach to the measurement of submit technology might be to aggregate measures of individual tasks, in order to represent the technology of the submit. When one moves to the corresponding instructional cell, however, there is danger of using the wrong level, since submit technology may not be qualitatively represented by the simple aggregation of tasks. Here, the unit of theory and the unit of measurement and interpretation may not be congruent. A more appropriate strategy might be to use a global measure of group technology such as Thompson's (1967) typology, that could more clearly reflect a unit level technological construct.

Implications of the Levels Perspective for Research and Practice

McGhee and Thayer (1961) provided the training field with a useful framework for describing the content of training needs assessment. This framework, comprising organizational, task, and person analysis, has stimulated research and orga

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ized the conduct of training needs assessment. The levels-of-analysis perspective presented in this chapter provides a new model of training needs assessment. The levels perspective deals explicitly with issues that were either implicit or ignored in the original framework and in subsequent research on needs assessment. The implications of this new model, both for research and for the practice of training needs assessment, are discussed in the following sections.

Research Directions

Since McGhee and Thayer's (1961) work, there has been an increase in the sophistication of methods for identifying the content of training needs (Wesley, 1984). The levels perspective represents a conceptual advancement that has implications for what kind of research needs to be done. From the levels perspective, research is needed about training needs assessment at the macro (organizational) level of analysis, about cross-level effects on the needs assessment process, and about the development of within level frameworks.

Needs Assessment at the Organizational Level of Analysis

Wesley (1984) notes the paucity of research on the training area of organizational analysis. From the levels perspective, it is clear that there is little research on training needs assessment at the organizational level, regardless of the content area (organizational, task, or person analysis).

One research direction concerns the development of methodologies that measure organizational in terms of goals, time orientations, technical environment, situational constraints, skill inventories, and climate. With such measures, differences across organizations could be related to differences in how training needs are assessed and in differences in types of training needs identified. For example, one manufacturing company may emphasize gaining market share, while a similar company focuses on short-term profits as a key goal. Given these goals, it is likely that the company with the market share orientation would have a longer term time orientation than the com
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be related to the effectiveness of a training system, would be a fruitful research direction.

Cross-Level Effects: The focus of the needs assessment literature on training, with respect to the content of organizational, task, and person analysis, has resulted in relative inattention to the relationships among variables. Such interrelationships across levels are explicitly accounted for in the levels framework when bond strength and constraints are examined. Conceptualizing the needs assessment process for training in terms of these links is another potentially productive line of research.

One line of possible research in this area would be the study of interdependencies across levels of analysis and of the constituting effects of higher level factors on lower level factors. For example, the goals of one work group in an organization may be more efficient if continually and remain technically up to date. A second work group in the same functional specialty may focus attention on maintaining good working relationships among employees. Examining the effects of these different group goals on individual goals (for example, the amount of variance in individual goals that is attributable to the group's goals) has important implications for determining whether training would be an appropriate response to a performance problem.

Another research direction would be to examine time issues across levels of analysis. From the levels perspective, higher levels base shorter time frames than lower levels do. For example, personal goals and objectives tend to change more rapidly than group and organizational goals. This means that higher level processes can be analyzed less often than processes at lower levels, and that manifestations of change that is due to interventions at higher levels will appear more slowly than signs of change from interventions at lower levels.

Research is needed on appropriate intervals for collecting information relevant to processes at different levels of analysis. For example, studies could be conducted examining optimal time intervals for conducting training needs analysis with respect to individual versus group versus organizational performance. It
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would also be useful to examine how long it takes for changes at higher levels to affect lower level processes (for example, how long it takes for changes in work technology to influence such individual level variables as job perceptions and work performance). Such research would provide preliminary information that is needed in the development of strategies for when and how to conduct training needs assessment.

**Within-Level Issues.** The research on training needs assessment has tended to examine only one content area at a time. From the levels perspective, the constructs relevant to organizational, task, and person analysis are not independent entities. Therefore, research is needed on interrelationships among constructs within levels of analysis. This type of research requires the development of models that show how the constructs relevant to training needs assessment are related.

For example, research could examine the different types of training needs that are identified when technical aspects as well as person analysis aspects are considered. Regardless of the level of analysis, there should be some degree of compatibility between the technical system and the social system (Griffin, 1982; Indik, 1980; Medla & Lee, 1979). Different degrees of compatibility may result in different sets of training needs. Thus, a routine technology will probably provide jobs with low variety and autonomy, in terms of tasks (Griffin, 1982), and this low degree of job scope may result in negative perceptions of the work environment. In such a case, training in human relations and interpersonal skills may be needed, to offset the dysfunctional aspects of routine jobs. Similarly, the number of situational constraints in a job may greatly affect individuals' levels of motivation or their perceptions of their units and of the organization. It would be useful to identify which situational constraints result in particular types of training needs and which constraints call for other interventions.

Research could also examine the implications of identifying training needs in one content area for identifying training needs in another. For example, how does a group's long- and short-term time frames for receiving feedback affect not only situational constraints in the group but also the skills that group members have for dealing with the scheduling, synchronization, and allocation of time? As another example, identifying training needs on the basis of technological factors may result in different types of person-centered training. Different technologies clearly require different types of skills training, but certain technologies (for example, those that require interdependence, coordination, and sharing of resources) may create greater needs for interpersonal skills and participative climates.

One purpose of conducting a training needs assessment is to determine whether there are performance problems and, if so, whether training is a possible solution. The development of within-level models (if one keeps in mind the constraints placed on those variables from higher-level variables) can aid in such analysis.

**Training Practice.**

Viewing needs assessment at the organizational, subunit, and individual levels of analysis provides a framework that highlights the need for congruence among construct definition, construct measurement, and interpretation of data. The following steps for conducting a needs assessment are based on the levels of analysis perspective. It is useful to consider the steps before actually collecting data during the needs assessment process.

**Identify the Level(s) of Analysis Relevant to the Current Needs Assessment.** It is quite possible for training needs to exist at one level but not at others. The training analyst must determine what level of analysis is relevant to the needs assessment. For example, an analysis may focus on the subunit level and determine the extent to which each subunit is meeting its goals, but problems that require a multilevel perspective may arise. Consider the case of an organization that is planning to centralize the training of its new employees. This training, rather than taking place informally on the job, will occur before the new employees are placed into work groups. In this case, the training...
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An analyst may need to examine not only the organizational goals relevant to the training but also the norms, values, and behaviors of the work group into which the new employees will be placed. Group norms (for example, “Do not believe what they tell you in the training course”) can have a major impact on the transfer of skills from training to the workplace. In this situation, the needs assessment would have to examine organizational as well as group-level factors. Another level of complexity is added if one also perceives the need to examine the expectations and goals of the individuals who are entering the training program.

Identifying the Conceptual Variables of Interest for the Appropriate Levels of Analysis. Once the relevant levels of analysis are identified, the specific conceptual variables of interest must also be identified. The training analyst must consider whether information relevant to goals and values, time orientation, technical environment, situational constraints, skills inventories, or climate must be measured and, if so, what types of information will be required. For example, the adoption of organizational policies on sexual harassment may require the development of a training program to impart knowledge about the policies as well as to provide supervisors with role-playing practice in handling complaints. In addition, collecting needs assessment information on the organization's objectives for adherence to these new policies it may be important to collect information on organizational climate as well as on the overall climate of the organization (or of its subunits) with respect to perceptions of fairness and equality.

After the critical variables have been identified, it is also important to consider the constraining influences of isomorphic or similar variables at higher levels of analysis. In the preceding example, individual values or attitudes about women may be affected by the norms and values of the work group. This situation may call for analysis of the strength and intensity of group norms before attention is focused on individual values and beliefs.

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Developing Pathways or Models That Link Variables Within and Across Levels of Analysis. After identifying the relevant variables, the training analyst must explicitly provide a framework for showing how the variables are linked to affect training needs. In this way, informed choices about the types of information to gather and how to interpret the results of the needs assessment process can be made beforehand.

For example, the introduction of robotics into a workplace often focuses immediate attention on necessary changes in skills, as a function of technological change. A simple model of this process is as follows: Introduction of robotics → Assessment of necessary skills → Skill-based training → Positive attitudes toward robotics. An alternative model for conducting a needs assessment in response to the introduction of robotics could look like this: Organizational goals for increased productivity → Technological process efficiency analysis → Assessment of work group climate for change → Examination of individual attitudes toward robotics → Assessment of necessary skills → Introduction of robotics → Skill-based training. The second model indicates that an assessment of the need for new skills may not be sufficient; in that case, the analyst should consider the organization’s productivity goals and efficiency concerns, as well as organizational or work group climate and attitudes toward the new technology. Inappropriate attitudes and climates may hinder the introduction of an innovation (Chao & Korolowsky, 1986). In the second model, information on whether an intervention is necessary must be gathered before the introduction of the new technology and the skill-based training program.

By developing pathways, the individual who conducts a training needs assessment not only makes explicit his or her view of the process but also must explore the feasibility of alternative processes. This stage of needs assessment is critical, since the model that ultimately frames the needs assessment process affects the types of variables examined, not to mention the interpretation of results.

Measure Variables and Interpret Results at the Appropriate Levels of Analysis. Once a model has been chosen, the measure...
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Content issues of training needs assessment with the levels perspective on organizations, to provide a useful framework for describing and understanding training needs assessment. The framework has resulted in the mapping of the needs assessment constructs and their relationships across levels of analysis. We believe that this new levels-of-analysis framework can lead to advances, both in the research and in the practice of training needs assessment.

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Conclusions

The idea that training spans multiple levels of analysis is not new (see Goldstein, Macy, & Pien, 1981; Henriques, 1976; McWalter & Brady, 1961). Nevertheless, until now a well-articulated framework has not been developed from the levels perspective. In this chapter, we have integrated the traditional
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