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DEFINING COMPETENCIES AND ESTABLISHING TEAM TRAINING REQUIREMENTS

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When it comes to training teams, little exists to guide human resource practitioners who must design training systems. In fact, empirically based prescriptions, guidelines, and specifications are virtually nonexistent for team training (Swezey & Salas, 1992). Nevertheless, recent efforts indicate that a systematic approach to establishing the parameters of team training is possible. In this chapter, we present a conceptual framework for describing team competencies that is based on past research and theorizing on team performance. The purpose of this framework is to guide specification of the competencies required for various types of teams in the workplace. We hope that this framework and associated propositions regarding training requirements and strategies will generate future research and theorizing so that empirically based principles of team training can be defined further.

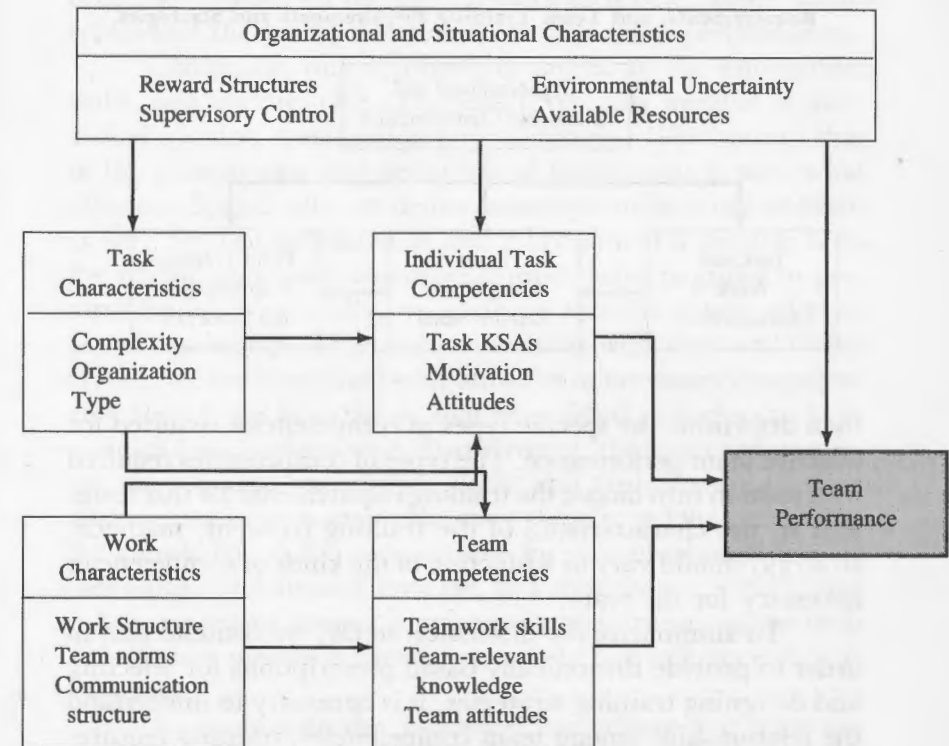
First, we present a general discussion of the team-performance area, in order to provide a context in which to introduce ideas about team competencies. A conceptual framework follows, which specifies the nature of the competencies required

for effective performance in various types of teams. Next, selected past work is reviewed, to delineate the particular team competencies (expressed as knowledge, skills, and attitudes) associated with categories in the framework. Finally, we describe the implications of the framework for establishing the training requirements for a particular team (with attention to organizational and task constraints) and for selecting appropriate training strategies.

Teams and Team Competencies

In general, theorizing about team performance and training has not yielded generalizable principles with practical utility, partly because of the complexity of the team area—in particular, because of the number of variables and constructs that must be considered in the study of teams in the natural environment (Salas, Dickinson, Converse, & Tannenbaum, 1992). In fact, teams in the work environment are required to perform diverse types of tasks and to operate under a variety of task and environmental conditions. This means that such constructs as team performance and team training can be understood only in light of the contexts in which they occur. These notions are summarized in Figure 10.1, which indicates that a number of factors influence team performance. The model in Figure 10.1 was proposed originally as a means of conceptualizing team performance and training (for more detail on the model and its development, see Tannenbaum, Beard, & Salas, 1992). We have modified it to emphasize the role of team competencies in team training and performance. According to the model, organizational and situational characteristics have an impact on several aspects of the functioning of teams and team performance. Thus it is difficult to think about teams without considering the contexts within which they operate. Further, the model suggests that task and work characteristics determine which individual task competencies and team competencies are required for successful team performance. Possession of these competencies is hypothesized to be a prerequisite of effective team performance. Overall, then, the model suggests that having the appropriate competencies

Figure 10.1. Model of Team Effectiveness.

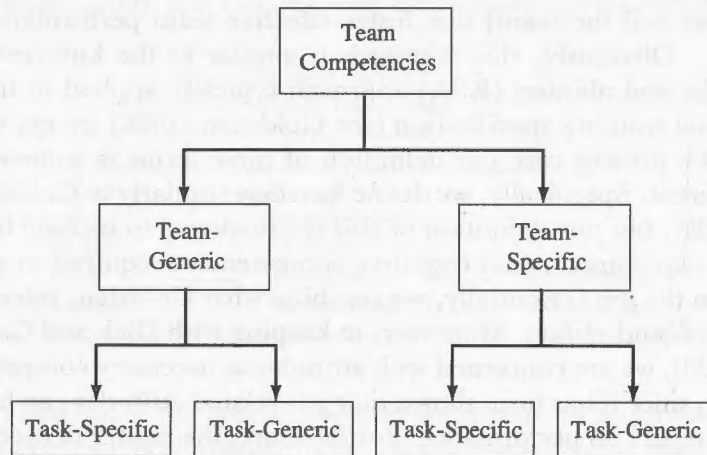


Source: Adapted from Tannenbaum, Beard, & Salas, 1992.

to fit the environment, task, and work situation will determine whether a team performs effectively.

Of primary importance to the current discussion is the notion that determining the team's competency requirements is crucial to establishing the training requirements (and hence the appropriate training strategy) for a team. Figure 10:2 depicts this relationship by extracting key concepts from the performance model (see Figure 10.1) and linking them specifically to training requirements and strategies. The path from left to right in Figure 10.2 shows that characteristics of the situation and the organization affect task and work characteristics. These factors

Figure 10.3. Nature of Team Competencies.



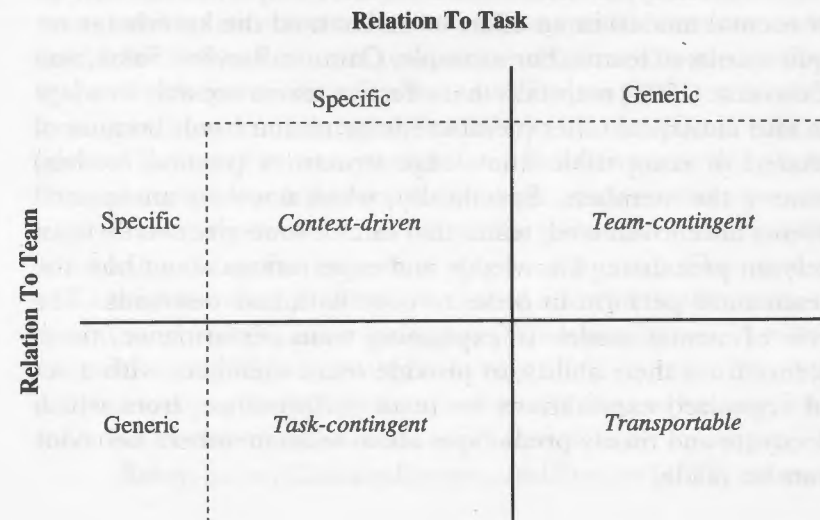
of any team with whom the individual works. By contrast, the second class of team competencies has meaning only with respect to specific team members. Examples of team-specific competencies include knowledge of teammates' characteristics, specific compensation strategies, and team cohesion (all of which depend on the particular team members involved). As another example of this distinction, it is appropriate to think of an attitude, such as collective orientation (an individual's general propensity to work on a team; see Driskell & Salas, 1992), as not necessarily specific to a particular team, whereas collective efficacy (belief in the team's competence; see Riggs, 1989) depends on the particular team members involved. The team competencies shown in Figure 10.3 may also be either specific or generic with respect to the *task*. That is, some team competencies involve the execution of teamwork behaviors in a specific task and/or context (the task's interaction requirements), whereas other team competencies are more generic with respect to a particular task (interpersonal skills, planning skills). The essential difference between these types of competencies rests on the degree to which they can be transported to other tasks. For example, general planning skills may be of use in several team tasks (they are transportable); knowledge of the specific role responsibilities in a particular team task may be applicable only to that task.

Combining these factors yields four related categories of team competencies, as shown in Figure 10.4. The first of these categories describes competencies that are specific to both the task and team. These are labeled *context-driven competencies* because they are dependent both on the nature of the task involved and on the particular team members involved. The second category of team competencies is labeled *team-contingent*. This category refers to competencies that are specific to a particular team but are generic with respect to the task (they can apply to a variety of tasks). Conversely, *task-contingent competencies* are specific to a particular task but can apply to a variety of teams (with varying membership). The final category of competencies is labeled *transportable competencies* because they are not specific to any particular task or team.

Delineation of Team Competencies

The framework presented in Figure 10.4 provides several general categories of team competencies and suggests that the situational and task characteristics impinging on a team will determine the

Figure 10.4. Types of Team Competencies.



type of competencies it requires. A next step in using this framework to guide the specification of training requirements and strategies is to delineate the specific team competencies that fall into each category. To do this, we shall present a selected review of past research, defining the various knowledge, skills, and attitudes that have been hypothesized to be associated with effective team performance. We will then show how the framework in Figure 10.4 can be used to categorize the various types of team knowledge, skills, and attitudes, so that they can be associated more directly with training requirements and strategies.

Knowledge Competencies for Teams

Several past efforts have provided insights into the knowledge requirements of teams. Team knowledge requirements include accurate, shared mental models; an understanding of the nature of teamwork and teamwork skills; knowledge of overall team goals, objectives, and missions; knowledge about boundary spanning; knowledge about fellow team members' roles and responsibilities; and cue-strategy associations (the association of cues in the environment to appropriate coordination strategies). Each of these knowledge competencies is described in more detail in the following sections.

Recently, several researchers have employed the concept of mental models in an effort to understand the knowledge requirements of teams. For example, Cannon-Bowers, Salas, and Converse (1993) maintain that effective teams are able to adapt to and anticipate other member's information needs because of shared or compatible knowledge structures (mental models) among the members. Specifically, when novel or unexpected events are encountered, teams that cannot strategize overtly must rely on preexisting knowledge and expectations about how the team must perform in order to cope with task demands. The role of mental models in explaining team performance, then, stems from their ability to provide team members with a set of organized expectations for team performance, from which accurate and timely predictions about team members' behavior can be made.

This hypothesis suggests that team members must hold knowledge structures about the task and the team that are compatible with those held by fellow team members. According to Rouse, Cannon-Bowers, and Salas (1992), team knowledge consists of several types of knowledge (declarative knowledge, procedural knowledge, and explanations), which can move from the specific and concrete to the general and abstract. Declarative team knowledge includes knowledge about the roles of team members, relationships among team members, and temporal patterns of team performance. Procedural team knowledge includes knowledge about how team members perform their functions, how team members perform together, and the overall mechanisms of team performance (how the task is accomplished). Explanatory team knowledge includes knowledge about why and how various team members are needed and about why the team performs its functions as it does in support of task accomplishment.

In a related formulation, Cannon-Bowers, Salas, and Converse (1993) maintain that team knowledge consists of mental models of the team's equipment, task, and team interactions—that is, models of how members' roles interact, how the various team roles are related to one another, which information sources are important, and the appropriate communication channels and patterns of information flow. Such knowledge forms the basis of team members' expectations in a task situation. By definition, holding task and team-interaction models that are compatible with those of one's teammates requires knowledge that is specific to a particular team and task. For example, team members must have knowledge about the specific team itself—about each of the other team members and the role he or she plays. This includes knowledge about the skills, abilities, preferences, experiences, and tendencies of specific teammates, along with knowledge about the roles they play on the team. This type of team-level knowledge affects (or should affect) a team member's selection of coordination strategies. For example, when working with a particularly competent teammate, a team member may be more willing to delegate responsibility to balance task load than when the teammate is perceived to be incompetent.

Baker, Salas, Cannon-Bowers, and Spector (1992) contend

that a specific type of team knowledge, called *interpositional knowledge*, is crucial to effective team functioning. These authors define a construct labeled *interpositional uncertainty*, which refers to the extent to which team members hold accurate knowledge about the role responsibilities of other members (a component of shared mental models, as defined by Cannon-Bowers, Salas, & Converse, 1993). It is hypothesized that high interpositional uncertainty among team members is associated with ineffective or degraded performance (Baker, Salas, Cannon-Bowers, & Spector, 1992). Preliminary evidence to support this contention was found with a simulated air-combat task.

Other categories of team-relevant knowledge required for effective teamwork are associated with an understanding of the nature of teamwork for accomplishing task goals. In this regard, team members must know about the teamwork skills that are required for successful team performance. In addition, team members must have knowledge of overall team goals and objectives, the team's mission, and other team-level constructs, such as norms and resources. Team members must also have knowledge of the boundary-spanning role (Sundstrom, De Meuse, & Futrell, 1990) that individual members play, as well as of the team's relationship to the larger organization.

Lanzetta and Roby (1960) propose that several general team functions contribute to effective performance. Two of these are consistent with our conceptualization of the team's knowledge competencies. First, *orientation* refers to the process by which the team becomes aware of the factors impinging on the task environment, and of where the team stands on these. This is similar to what was noted above: namely, that team members must have knowledge of the overall goals, mission, norms, and resources of the team. Second, *mapping* is the process by which the group learns the action-outcome contingencies that exist under various task conditions.

The concept of mapping requires further discussion because it is crucial to team performance. In fact, we maintain that cue-strategy associations are of paramount importance to team performance. In order to be effective, team members must recognize the task and environmental cues that trigger specific

strategy changes. In other words, team members must learn to recognize when particular interaction processes are appropriate and how they must be implemented. In some ways, appropriate strategy formation is the cornerstone of teamwork because it assumes that team members can determine when teamwork behavior is required, and what type. The development of appropriate cue-strategy associations is highly task-specific, as well as team-specific in the sense that behavior will change as a function of the particular team members who are present.

To summarize, past research suggests several categories of team knowledge that are hypothesized to be important for effective team performance. This knowledge forms the basis of team functioning by providing an understanding of global teamwork concepts (understanding of teamwork skills) and specific aspects of team performance (knowledge of team goals). In addition, requisite team knowledge lays the groundwork for development of the necessary teamwork skills.

Skill Competencies in Teams

In recent years, there has been a trend toward defining teamwork behaviorally, as a set of teamwork skills (Glickman et al., 1987; Prince & Salas, 1993; McIntyre & Salas, this volume). This trend has been most pronounced in research concerning military teams, but the results have implications for other types of teams where interdependence and coordination are required. Unfortunately, the literature in this area is often confused and contradictory. In fact, it is safe to conclude that the literature is plagued by inconsistency, both in the labels and in the definitions of teamwork skills used in past work. Specifically, researchers have often used different labels to refer to the same skills, or similar labels to refer to different skills. Moreover, the definitions of skills (and subskills) employed in the literature have often been ignored by subsequent researchers, so that each new effort appears to define a new set of skills.

In an attempt to impose some order on this state of affairs, we conducted an extensive review of the literature, both empirical and theoretical. Table 10.1 presents a summary of the

Table 10.1. Teamwork Skill Dimensions.

<i>Skill Dimension</i>	<i>Definition</i>	<i>Subskills/Alternative Labels</i>
Adaptability ^a	The process by which a team is able to use information gathered from the task environment to adjust strategies through the use of compensatory behavior and reallocation of intrateam resources	Flexibility Capacity for closure Development of innovations Mutual adjustment Compensatory behavior Backing-up behavior Provide/ask for assistance Fail stop Dynamic reallocation of functions
Shared situational awareness ^b	The process by which team members develop compatible models of the team's internal and external environment; includes skill in arriving at a common understanding of the situation and applying appropriate task strategies	Situational awareness Orientation Team awareness Development of integrated model of environment Development of system awareness Shared problem-model development
Performance monitoring and feedback ^c	The ability of team members to give, seek, and receive task-clarifying feedback; includes the ability to accurately monitor the performance of teammates, provide constructive feedback regarding errors, and offer advice for improving performance	Intramember feedback Performance feedback Planning review Feedback/reinforcement Acceptance of/giving suggestions, criticism Mutual performance monitoring Monitoring and cross-checking Systems monitoring Performance monitoring Error identification/correction Intrateam monitoring Strategy development Procedure maintenance
Leadership/team management ^d	The ability to direct and coordinate the activities of other team members, assess team performance, assign tasks, motivate team members, plan and organize, and establish a positive atmosphere	Task structuring Delegation and assignment Task assignment Resource distribution Resource management Performance direction Establishment of priorities Mission analysis Motivation of others Leadership control Goal setting Drive to completion Goal orientation
Interpersonal relations ^e	The ability to optimize the quality of team members' interactions through resolution of dissent, utilization of cooperative behaviors, or use of motivational reinforcing statements	Conflict resolution Cooperation (interpersonal) Assertiveness Morale building (behavioral reinforcement) Boundary spanning
Coordination ^f	The process by which team resources, activities, and responses are organized to ensure that tasks are integrated, synchronized, and completed within established temporal constraints	Task organization Coordination of task sequence Integration Task interaction Technical coordination Response coordination Timing and activity pacing
Communication ^g	The process by which information is clearly and accurately exchanged between two or more team members in the prescribed manner and with proper terminology; the ability to clarify or acknowledge the receipt of information	Information exchange Closed-loop communication Information sharing Procedural talk Volunteering/requesting information Consulting with others Effective influence Open exchange of relevant interpretations Evaluative interchange

Table 10.1. Teamwork Skill Dimensions, Cont'd.

Skill Dimension	Definition	Subskills/Alternative Labels
Decision making ^a	The ability to gather and integrate information, use sound judgment, identify alternatives, select the best solution, and evaluate the consequences (in team context, emphasizes skill in pooling information and resources in support of a response choice)	Problem assessment Problem solving Emergence of solutions Probabilistic structure Hypothesis formulation Information processing Information evaluation Planning Plan development Use of information Metacognitive behavior Implementation (jurisdiction)

Sources: ^aAlexander & Cooperband, 1965; Johnston & Briggs, 1968; McCallum, Oser, Morgan, & Salas, 1989; McIntyre & Salas, this volume; Streufert & Nogami, 1992.
^bAlexander & Cooperband, 1965; Briggs & Johnston, 1967; Franz, Prince, Cannon-Bowers, & Salas, 1990; Lanzetta & Roby, 1960; Nieva, Fleishman, & Reick, 1978; Orlady & Foushee, 1987.
^cAlexander & Cooperband, 1965; Briggs & Johnston, 1967; Cooper, Shiflett, Korotkin, & Fleishman, 1984; Gaddy & Wachtel, 1992; Glickman et al., 1987; McCallum, Oser, Morgan, & Salas, 1989; McIntyre & Salas, this volume; Morgan, Glickman, Woodard, Blaiwes, & Salas, 1986; Orlady & Foushee, 1987; Oser, McCallum, Salas, & Morgan, 1989; Swezey & Salas, 1992.
^dBales, 1950; Federman & Siegel, 1965; Franz, McCallum, Lewis, Prince, & Salas, 1990; Franz, Prince, Cannon-Bowers, & Salas, 1990; Nieva, Fleishman, & Reick, 1978; Orasanu, 1990; Orlady & Foushee, 1987; Prince, Chidester, Cannon-Bowers, & Bowers, 1992; Shiflett, Eisner, Price, & Schemmer, 1982; Siegel & Federman, 1973.
^eFranz, McCallum, Lewis, Prince, & Salas, 1990; Franz, Prince, Cannon-Bowers, & Salas, 1990; Gaddy & Wachtel, 1992; Jordan, Jensen, & Terebinski, 1963; McCallum, Oser, Morgan, & Salas, 1989; Orlady & Foushee, 1987; Oser, McCallum, Salas, & Morgan, 1989; Prince, Chidester, Cannon-Bowers, & Bowers, 1992; Tannenbaum, Beard, & Salas, 1992.
^fKleinman & Serfaty, 1989; Nieva, Fleishman, & Reick, 1978; Orlady & Foushee, 1987; Shiflett, Eisner, Price, & Schemmer, 1982; Siskel & Flexman, 1962.
^gFederman & Siegel, 1965; Franz, McCallum, Lewis, Prince, & Salas, 1990; Franz, Prince, Cannon-Bowers, & Salas, 1990; Gaddy & Wachtel, 1992; McCallum, Oser, Morgan, & Salas, 1989; McIntyre & Salas, this volume; Orasanu, 1990; Orlady & Foushee, 1987; Oser, Prince, & Morgan, 1990; Siegel & Federman, 1973; Streufert & Nogami, 1992.
^hAlexander & Cooperband, 1965; Federman & Siegel, 1965; Franz, McCallum, Lewis, Prince, & Salas, 1990; Franz, Prince, Cannon-Bowers, & Salas, 1990; Lanzetta & Roby, 1960; Orasanu, 1990; Orlady & Foushee, 1987; Prince, Chidester, Cannon-Bowers, & Bowers, 1992; Siegel & Federman, 1973; Streufert & Nogami, 1992.

Defining Competencies

skill labels, definitions, subskills, and alternative labels presented by various researchers. In deriving this table, we first generated an initial list of over 130 skill labels found in the literature to describe the skills required for teamwork. This list was sorted into major skill dimensions, with associated subskills, by two independent raters. Where appropriate, similar skills (based on definitions provided by authors) were grouped together, and a common definition of the skill dimension (column 2) was extracted. This sorting process also led to the generation of a list of major subskills associated with each skill dimension, and to a list of alternative labels that have been used to refer to the same subskills (these are listed under each subskill). The notes to Table 10.1 give the sources from which skill labels and definitions were extracted.

Our conclusion is that a core set of skill dimensions common to all (or most) investigations can be generated. These are adaptability, shared situational awareness, performance monitoring and feedback, leadership/team management, interpersonal skills, coordination skills, communication skills, and decision-making skills. It should be noted that we are not presenting this table as a means of suggesting that the skills shown in it comprise a new definition of teamwork; rather, we present this table as a means of synthesizing a great deal of rather disjointed, often conflicting, and certainly confusing literature about teams. The following sections review the research used to derive the skills shown in Table 10.1.

To begin with, Morgan, Glickman, Woodard, Blaiwes, and Salas (1986) employed a critical-incidents technique with instructors in a U.S. Navy training program to generate examples of effective and ineffective behaviors for the following skill dimensions: communication, adaptability, cooperation, acceptance of suggestions or criticism, giving suggestions or criticism, team spirit and morale, and coordination. Results of a field study indicate that the effective teams exhibited proportionately more effective behaviors and fewer ineffective behaviors in each of these skill areas, as compared to the ineffective teams.

Similarly, Oser, McCallum, Salas, and Morgan (1989) analyzed the specific behaviors exhibited by effective and ineffective

U.S. Navy command-and-control teams. They conclude that teamwork can be defined behaviorally to include identification and resolution of errors, coordinated information exchange, and team reinforcement. Oser, McCallum, Salas, and Morgan (1992) conducted a subsequent analysis with a different type of U.S. Navy team and found that intermember assistance (prompting and directing other members), intrateam reinforcement (praising other members, thanking another member for correcting an error), and intrateam monitoring (acknowledging and correcting each other's errors) were all associated with effective team performance, as rated by experts.

McIntyre and Salas (this volume) have summarized the results of several investigations of teamwork, including those reported above. Based on lessons learned about the nature of teamwork, as presented by these authors, the following implications for specifying teamwork skills can be generated: performance monitoring, feedback, closed-loop communication, and backing-up behaviors.

Working with cockpit crews, Franz, Prince, Cannon-Bowers, and Salas (1990) conducted a needs analysis of air-crew coordination skills, using structured interviews and a behavioral rating form. The researchers generated thirty-seven behavioral statements related to effective teamwork in the cockpit. These were augmented via interviews with job experts (pilots), leading to a total fifty-five behavioral statements. A sample of 134 job experts then rated behaviors on the basis of criticality, difficulty, frequency, and importance to train. Results indicate that the job experts rated teamwork behaviors as critical to their jobs, frequently occurring, and important to train. These researchers also conclude that the teamwork behaviors can be classified into seven skill dimensions: mission analysis (which includes planning and strategizing), assertiveness, adaptability/flexibility, situational awareness, decision making, leadership, and communication. Preliminary support for the efficacy of these skill dimensions was found by Franz, McCallum, Lewis, Prince, and Salas (1990).

Also in the area of aviation training, Prince, Chidester, Cannon-Bowers, and Bowers (1992) indicate that commercial

aviation programs have sought to train a host of related teamwork skills in order to enhance cockpit crews' performance. Unfortunately, there has been a lack of standardized definitions for skill dimensions among programs, so that similar skill labels can refer to different behaviors across programs. Overall, commonly trained skill dimensions appear to include planning, situation awareness, leadership, communication, assertiveness, problem solving, and feedback.

Other researchers have offered definitions of teamwork that can be used to infer the required team skills. For example, Siskel and Flexman (1962) define *coordination* as the ability of team members to work together, anticipate each other's needs, inspire confidence, and communicate in an efficient manner. Alexander and Cooperband (1965) maintain that *cooperation* can be defined as a skill whereby team members possess information regarding the strengths and weaknesses of one another, offer help only when other team members need it, pace their activities to fit the needs of the team, and behave in an unambiguous manner so that their actions are not misinterpreted. (It should be noted that this definition incorporates both knowledge and skill competencies, as defined here.)

In other work, Lanzetta and Roby (1960) define a team skill labeled *jurisdiction*, which is the process by which the team chooses its responses and implements decisions during task performance. Bass (1982) suggests that group effectiveness is determined by behaviors that involve goal setting, information sharing, and intermember consultation. Bass also hypothesizes that interaction processes are a crucial aspect of team functioning. Bass contends, in this regard, that the content of interaction (goal setting, information sharing, consulting with others), as well as patterns of interaction (number of communications, length of time spent talking, time to make a decision) and outcomes of interaction (task versus interpersonal focus, turnover, flexibility of the group), modify how individual performance contributes to performance of the team. With respect to the current discussion, we can hypothesize that interaction processes describe an important set of skills required for successful team performance. These appear to be most closely related to what Bass

calls the *pattern of interaction*—how teams communicate and arrive at decisions.

Several researchers have also hypothesized that interpersonal skills are required for effective teamwork. Empirical tests of this contention have yielded mixed results. For example, Johnston and Briggs (1968) have found that errors were less frequent on teams where members were allowed to correct and provide feedback to one another.

A number of propositions regarding effective teamwork skills can be inferred from a review by Briggs and Johnston (1967) describing the results of several studies with U.S. Navy teams. On the basis of findings from these and other studies, the following teamwork skills can be delineated: load balancing, compensatory behavior, adaptability, and flexibility. An early study by Chapman, Kennedy, Newell, and Biel (1959) also provides support for the notion that flexibility is a desirable teamwork skill. These researchers show that teams are better able to handle increased task loads if allowed to use flexible work structures in an air-defense task.

Other researchers have been concerned specifically with communication skills as a requirement for effective teamwork. For example, Oser, Prince, and Morgan (1990) have found that cockpit crews in nonroutine (emergency) conditions are more likely to offer commands, suggestions, statements of intent, and replies than in routine situations. Also working with cockpit crews, Foushee (1982) reports a tendency for ineffective crews to communicate less in a study conducted with a full-mission simulator. Communication content differences were also associated with crew effectiveness. Other work (described above) conducted with U.S. Navy teams suggests that effective teamwork includes the ability to communicate effectively (Morgan, Glickman, Woodard, Blaiwes, & Salas, 1986).

Orasanu (1990) and Orasanu and Salas (1993) argue that teams must dynamically form shared models of the situation and appropriate strategies for coping with task demands (called *shared problem models*). We distinguish this concept from shared mental models in that shared mental models are preexisting knowledge structures developed over time and generalized to

a variety of situations. These mental models exist in individual team members and provide the *knowledge* foundation necessary for successful team performance. Development of shared problem models, by contrast, involves a *skill* that team members develop, which enables them to apply task and team knowledge to the formation of compatible responses in a task situation.

In a related formulation, Kleinman and Serfaty (1989) suggest that teams can develop implicit coordination skills in order to cope with high workloads. Specifically, team members in a simulated command-and-control task were able to maintain performance under high workload conditions, even though overt communication decreased. The authors reason that the team members were exercising mutual mental models of the task (discussed above), so that the need for overt coordination of activity was reduced. Kleinman and Serfaty label this an *implicit coordination strategy* (decreasing communication but maintaining performance). Therefore, skill in employing implicit coordination strategies involves a team member's recognizing when and how to rely on assumptions regarding task performance and when to use more explicit (communication) strategies.

Another team-level competency involves skill in dynamically reallocating functions (also called *load balancing* by some researchers; see Briggs & Johnston, 1967). Dynamic reallocation of functions is a process whereby a team can shift the workload among its members to achieve balance during high-workload, time-pressured, or emergency situations. It is also a skill that requires more than one team member in that the appropriate reallocation of any function depends on the functional responsibilities and workloads of other members at any particular time.

Other team-level skills that have been hypothesized in past research are related to the required mechanisms of interaction in teams. In this regard, Nieva, Fleishman, and Reick (1978) have developed a taxonomy of the interactive functions hypothesized to enable a team to perform effectively, above and beyond the performance of individual members. According to these researchers, four categories of interactive functions allow a team to achieve its objectives: orientation, organization, adaptation, and motivation. *Orientation* refers to the processes by which information

relevant to task accomplishment is generated and disseminated to team members (as such, it is most appropriately categorized as a knowledge competency, under the current formulation). *Organization* is the process by which team members coordinate their tasks, pace their activities, balance the work load among themselves, and assign task priorities. *Adaptation* refers to the processes that enable teams to accomplish their tasks via compensatory adjustment and timing, mutual performance monitoring, and error adjustment. *Motivation* refers to those team processes in which team objectives are defined and the team is energized to achieve the objectives, through norm development, conflict resolution, and reinforcement (we include this as a team attitude, discussed further in a later section).

To summarize, it is obvious that a considerable amount of theorizing and research has been devoted to the delineation of teamwork *skills*. In fact, there is quite a bit more of this type of research than there is about required team *knowledge* and/or *attitudes*.

Attitude Competencies in Teams

So far, we have concentrated on the cognitive and behavioral skills necessary for team performance, but we must also address the affective or attitudinal factors critical to team functioning. Numerous researchers have studied attitudes in terms of individual performance and training objectives (Gagné, 1985; Dick & Carey, 1990; Noe, 1986; Tannenbaum & Yukl, 1992). Nevertheless, their impact on team functioning and effectiveness has been largely ignored. The few investigations that do exist suggest that attitudes are strongly associated with team performance, however (Ruffell-Smith, 1979; Helmreich, Foushee, Benson, & Russini, 1986).

For the purpose of this discussion, we define *attitude* in keeping with Dick and Carey (1990): as an *internal state that influences an individual's choices or decisions to act in a certain way under particular circumstances*. We focus our discussion on those attitudes that are unique to the team context—that is, those that have been shown to have a direct bearing on the team's interaction pro-

cesses and on the ability of an individual to flourish in a team context. These include attitudes toward teamwork, the team concept, a collective orientation, collective efficacy, cohesion, mutual trust, and shared vision. The following sections describe these constructs in more detail.

Several studies have shown that an individual's attitudes toward teamwork can have a significant impact on performance. For example, a study by Cooper, White, and Lauber (1980) analyzes the causes of aircraft accidents and isolates a number of attitudes related to effective and ineffective crew performance. Similarly, the study conducted by Helmreich, Foushee, Benson, and Russini (1986) found that attitudes can be used to separate effective from ineffective cockpit managers. Further, work with the Cockpit Management Attitudes Questionnaire (Gregorich, Helmreich, & Wilhelm, 1990) suggests that beliefs about the importance of teamwork skills—coordination and communication, command responsibility, and the ability to recognize stressor effects—may significantly affect crew processes and performance outcomes, although direct causal links have yet to be established; further research into this relationship is needed.

Another important attitude for team members to possess is that of a well-developed team concept, or belief in placing the team's goals above and beyond those of its individual members. This belief, referred to as a *collective orientation*, can be defined as an attraction to the team as a means of task accomplishment (Driskell & Salas, 1992). It involves the capacity to take others' behavior into account during group interaction, as well as the belief that a team approach is superior to an individual one.

Several theorists have shown a relationship between collective orientation and cooperative behavior in groups (Deutsch, 1960; Meeker, 1983; Rubin & Brown, 1975), but very little is known about how attitudes toward collectivity affect the team's task performance. An exception is a study by Davis (1969) in which performance on a problem-solving task was predicted by the collective orientation of the group members.

Further evidence in support of the positive effect of collective orientation on team performance was provided recently

by Driskell and Salas (1992). Results of a study with two-person teams (classified beforehand as either egocentric or collectively oriented) indicate that the egocentric teams performed no better than their members did as individuals. By contrast, collectively oriented teams performed significantly better than the individual members that comprised them. Driskell and Salas argue that these findings show that the collectively oriented teams outperformed their egocentric counterparts because their members took advantage of the benefits offered by teamwork.

Another attitude that has been hypothesized to be important in a team context is collective efficacy, which refers to the ability of the team to perform effectively as a unit, given some set of specific task demands (Bandura, 1986). It can be defined specifically as an individual team member's assessment of his or her team's collective ability to perform the task at hand (Riggs, 1989). This concept is similar to that of potency (Guzzo, 1986). The notion of collective efficacy is amplified by Shamir (1990) to include other attitudinal components, such as the individual's perception of the collective success of the group, judgments regarding team leadership, the team's power base, its cohesiveness, and its structure.

With respect to performance, collective efficacy is hypothesized to have a facilitating affect (Shamir, 1990; Bandura, 1986; Guzzo, 1986). Moreover, there is general agreement that the mechanism by which collective efficacy affects performance is motivational (team members with high efficacy will be more motivated to perform well). Despite the fact that a relationship between collective efficacy and team performance has been theorized by several researchers (Bandura, 1986; Guzzo, 1986; Travillian, Baker, & Cannon-Bowers, 1992), little empirical research has been conducted to support these claims. These and the few other studies that do exist, however, support the contention that increased collective efficacy improves task performance (Forward & Zander, 1968; Shea & Guzzo, 1987). These findings suggest that members' confidence in the task-specific ability of the team is a contributing factor to the team's actual performance—that is, for team members to be motivated to perform the necessary teamwork behaviors (depending on and as-

sisting their teammates), they must be confident that the team can master the task objectives.

Another team-level attitude of interest here is cohesion. Cohesion, or team morale, has long been considered one of the most critical aspects of team functioning (Mayo, 1933). A basic assumption held by most researchers is that the higher the team's cohesiveness, the more effective the team will be in performing a task (Martens & Peterson, 1971). The most widely accepted definition of *cohesion* is provided by Festinger, Schachter, and Back (1950) who conceptualized it as the "total field of forces which act on members to remain in the group" (p. 164). Unfortunately, since the time it was proposed, this definition has led to numerous conceptualizations and operationalizations of the construct in subsequent research. For example, some studies have operationalized cohesion as a socially oriented attitude toward developing and maintaining interpersonal relationships within the team. Others have defined it as a task-oriented belief about achieving the group's goals through commitment to the team approach (Rainey & Schweickert, 1988). As a consequence, many conflicting and inconsistent results have been obtained from past work. For example, some researchers have found positive associations between cohesion and team functioning (Greene & Schriesheim, 1980; Hare, 1962; Hemphill & Sechrest, 1952; Straub, 1975). Others have obtained negative results (Roby, 1953; Stogdill, 1972; Weick & Penner, 1969). Still others have found nonsignificant results (Lodahl & Porter, 1961; Terborg, Castore, & DeNinno, 1976; Tziner & Vardi, 1982).

It is difficult to draw definitive conclusions in this area, but it appears that when the team is well trained, has confidence in its abilities, and is goal-oriented, the effects of cohesion will only serve to strengthen team effectiveness. It should be noted, however, that the instrumentality of cohesion is for the most part a function of the social norms prevalent in the team; that is, a cohesive team is likely to perform effectively only if its members are committed to the organization within which the team functions (Tziner & Vardi, 1983). When this is not the case, a cohesive team can set internal norms that are counterproductive to performance (Stogdill, 1972; Tziner, 1982).

A number of other job-related attitudes can be hypothesized to affect team performance. For example, Nieva, Fleishman; and Reick's concept of motivation (1978) suggests that teams must be energized to achieve valued objectives through norm development, conflict resolution, and reinforcement. In addition, such variables as mutual trust and shared vision can be expected to affect team performance. *Mutual trust* can be defined as an attitude held by team members regarding the aura or mood of the team's internal environment. It connotes an atmosphere where the opinions of team members are allowed to emerge, where members are respected by their co-workers, and where innovative proactive behavior is rewarded (Rehder & Smith, 1986; Vaziri, Lee, & Krieger, 1988). Rehder and Smith point out that mutual trust can be created through the implementation of a collaborative, problem-solving approach to team management. The importance of mutual trust is further supported by Vaziri, Lee, and Krieger, who describe how fostering mutual trust and a sense of openness in management and decision-making processes can lead to a more harmonious and productive team environment.

Shared vision refers to a commonly held attitude regarding the direction, goals, and mission of an organization or team. Niehoff, Enz, and Grover (1990) have explored this concept in depth and examined the relationship between management actions that foster a shared vision and the degree of commitment, job satisfaction, and role ambiguity present in employees. The results indicate that managers' actions to inspire shared vision were related to the outcomes of interest. Although these outcomes were not directly related to performance, it can be proposed that a shared vision of mission and goals will affect performance quality. In fact, a study by Tjosvold and Tsao (1989) examines this hypothesized relationship at the organizational level. The results indicate that a shared vision contributes to effective collaboration, commitment, and productivity.

To summarize, a number of attitudes have been hypothesized to affect team performance. Putting them together with the skill and knowledge competencies already delineated, we can now formulate a comprehensive picture of the competencies required for effective team performance.

Proposed Competencies for Effective Team Performance

Table 10.2 summarizes what has been presented so far. Specifically, this table conceptualizes each team competency (knowledge, skills, attitudes) as falling into context-driven, team-contingent, task-contingent, or transportable categories. It should be noted that all these competencies may be important and may contribute to team effectiveness, but their relative importance and the feasibility of developing them will be influenced by the nature of the task and the environment in which the team operates. What follows is a brief discussion of the conditions in which competencies in each of the four categories are most important, and of the specific competencies associated with each category.

Context-Driven Team Competencies

When a task is highly demanding, it requires a team that is able to quickly adjust its strategy in response to task demands. In such a case, team members will benefit from competencies that are specific to both the task and the team. As noted, this category of situation is labeled *context-driven*, to refer to the fact that the nature of the required teamwork competencies is driven by the particular task and team involved. Teams that have fairly stable membership and perform a single or small number of tasks are more likely to require the competencies in this category. Examples of teams that would benefit from context-driven competencies include surgery and other medical teams, combat teams, sports teams, and air crews.

Knowledge Competencies

On the basis of theorizing about shared mental models, we hypothesize that several team-specific, task-specific knowledge requirements exist for teams in this category. Specifically, team members must have accurate knowledge about one another (the task-related competence, preferences, tendencies, strengths, and weaknesses of teammates) as a basis for formulating specific expectations for teammates' performance. In addition, team members must have knowledge about the specific role responsibilities

Table 10.2. Proposed Competencies for Teams.

<i>Nature of Team Competency</i>	<i>Description of Team Competency</i>	<i>Knowledge</i>	<i>Skills</i>	<i>Attitudes</i>
Context-driven	Team-specific; task-specific	Cue-strategy associations Task-specific teammate characteristics Team-specific role responsibilities Shared task models Team mission, objectives, norms, resources	Task organization Mutual performance monitoring Shared problem-model development Flexibility Compensatory behavior Information exchange Dynamic reallocation of functions Mission analysis Task structuring Task interaction Motivation of others	Team orientation (morale) Collective efficacy Shared vision
Team-contingent	Team-specific; task-generic	Teammate characteristics Team mission, objectives, norms, resources Relationship to larger organization	Conflict resolution Motivation of others Information exchange Intrateam feedback Compensatory behavior Assertiveness Planning Flexibility Morale building Cooperation	Team cohesion Interpersonal relations Mutual trust
Task-contingent	Team-generic; task-specific	Task-specific role responsibilities Task sequencing Team role-interaction patterns Procedures for task accomplishment Accurate task models Accurate problem models Boundary-spanning role Cue-strategy associations	Task structuring Mission analysis Mutual performance monitoring Compensatory behavior Information exchange Intrateam feedback Assertiveness Flexibility Planning Task interaction Situational awareness	Task-specific teamwork attitudes
Transportable	Team-generic; task-generic	Teamwork skills	Morale building Conflict resolution Information exchange Task motivation Cooperation Consulting with others Assertiveness	Collective orientation Belief in importance of teamwork

in the team (which may change as a function of the particular team members present). Further, team members must have common task models (must interpret task information and demands in a similar manner) and understand the task-specific information flow required for effective performance. Team members must also have accurate knowledge regarding cue-strategy associations (that is, how and when to change coordination strategies). Finally, a team in this category must have a common understanding of the team goal and mission, team norms, and team resources. All these competencies have in common that they are meaningful only for dealing with a specific team and task. When either of these changes, the knowledge must be adjusted or augmented to incorporate new team members and/or different task demands.

Skill Competencies

Several team-specific, task-specific skills enable teams to optimize performance in demanding situations (see Table 10.2). For example, team members must have skill in task organization (that is, in sequencing and integrating task inputs according to team and task demands). Team members must also possess skill in dynamically reallocating functions (or balancing workloads) according to both task demands and the ability of teammates (a teammate's level of competence will determine when and how reallocation of functions can and should occur). Teams must also develop shared problem models. This skill requires being able to recognize and integrate task contingencies and then form, adjust, and act on models of the problem that are compatible with those held by teammates. Finally, team members must be flexible—able to adapt their strategies according to the particular task demands at hand—and must be skilled in exchanging information efficiently, analyzing the task or mission accurately, monitoring each other's performance, interacting constructively, and maintaining task motivation.

It should be noted here that knowledge and skill competencies are closely related. Specifically, the existence of accurate task and team models enables team members to execute crucial

skills. For example, at the knowledge level, members must hold accurate models of their teammates' characteristics, so that expectations for performance are formed. At the skill level, this knowledge allows team members to adjust task strategies so that they are optimal with respect to their teammates' expected performance.

Attitude Competencies

In keeping with the nature of the competencies in this category, we hypothesize that certain team attitudes are meaningful only in the context of a particular task and team. For example, the development of collective efficacy can be hypothesized to be both team- and task-dependent, since it rests on beliefs about the competence of a particular team performing a particular task. In addition, we hypothesize that team orientation is specific to the team members involved and is affected by the task and the task situation.

Team-Contingent Competencies

In some cases, the team will require competencies that are specific to that team but not to a particular task. Such a situation involves a team whose members are consistent and who must work together across a variety of tasks. Self-managing work teams, management teams, quality circles, and teams that comprise functional departments are all examples of teams that fall into this category.

Knowledge Competencies

Relying again on the theory of shared mental models, we hypothesize that team members must share all the knowledge specified for context-driven team competencies that is specific to the team, but not to the task. This includes knowledge about teammate characteristics (general abilities, preferences, tendencies, strengths, weaknesses), and team norms, resources, mission, and objectives. All of this shared knowledge contributes to the

members' ability to come to a shared assessment of a problem quickly and to coordinate, with little or no need to communicate verbally. It helps ensure that the team members' resources are being applied to the accomplishment of a common goal. In addition, team members must have an understanding of how the team fits into the larger organization, so that they are aware of how they must interact with other organizational units, of what is expected of them, and of how they fit into the accomplishment of the larger organizational goals.

Skill Competencies

Team competencies associated with this category include several of the skills or subskills summarized in Table 10.1. In particular, we hypothesize that teams in this category require skill in interpersonal relations and leadership/team management (including conflict resolution, assertiveness, maintaining task motivation, morale building, and cooperation). Other important skills in this category involve information exchange, intrateam feedback, compensatory behavior, flexibility, and planning. All these skills are hypothesized to affect team performance, but they are not necessarily limited to a particular task; that is, a team member can be trained in transportable information-exchange skills (how to speak clearly, concisely, and in an unambiguous manner) that can improve his or her ability to communicate across a variety of team tasks. Moreover, we contend that team members in this category will benefit from training that improves their ability to work together as a team, even when the particular task functions vary.

Attitude Competencies

A number of attitudes can be listed in this category. For example, team cohesion can develop among members who work together to perform several different tasks. Similarly, interpersonal relations and mutual trust fall into this category, since they are dependent on particular team membership; that is, these competencies are dependent on the particular team members

involved but are not necessarily specific to a particular task. For example, a team of individuals who work together consistently can develop sound interpersonal relations that cut across particular tasks.

Task-Contingent Competencies

In situations where team members perform a specific team task but do not work with a consistent set of teammates (because of organizational policy or rapid turnover), they must possess team competencies that are specific to the task but not dependent on particular teammates. Examples of teams that fall into this category include some firefighting teams, air crews, medical teams, and others for which the task remains constant but team membership does not.

Knowledge Competencies

Borrowing again from the theory of shared mental models, we hypothesize that teams in this category must possess accurate models of the task and problem, and an understanding of task-specific role responsibilities (independent of the particular people who may occupy these roles), requirements for task sequencing, team role-interaction patterns, and mechanisms and procedures for task accomplishment. These types of knowledge provide team members with a basis for generating predictions of how the task will unfold and expectations for how they should perform. A final type of knowledge involves understanding the boundary-spanning role and its impact on team functioning.

Skill Competencies

Many task-specific skills are not dependent on or specific to a particular team. These include skills in leadership or team management (task structuring, mission analysis), feedback and performance monitoring (mutual performance monitoring and intrateam feedback), and coordination (task interaction). In addition, several other skills (assertiveness, planning, situational awareness)

are hypothesized to be important for teams that must perform when the task but not the team remains constant. In fact, the difference between the competencies in this category and those specified in the team-contingent category is that we are referring here to skills that involve particular task-related behaviors. For example, team members may possess transportable information-exchange skills that have no particular task referents. By contrast, team members may possess information-exchange skills that are more task-specific (for example, knowing that the receipt of certain messages should be verified, given their criticality to the task, regardless of the particular team members involved).

Attitude Competencies

On the basis of research conducted with air crews, we hypothesize that task-specific attitudes toward teamwork are important to team performance. These can be defined as the attitudes that the team members have toward working as a team. For example, if a member of a team in research and development does not believe that there is any advantage to working on a team to develop a proposal, then he or she probably will not act in a manner that encourages participation from teammates.

Transportable Team Competencies

Transportable team and task competencies are required when team members work on a variety of tasks and with a variety of teams. Examples of teams in this category include task forces, process-action teams, and project teams. Organizations may also want employees to have transportable team competencies as a first step in establishing a team culture or philosophy. In these circumstances, an organization may want to train employees in the team competencies that are applicable to a variety of team situations, regardless of the particular task or team. More specific training (specific to the task or team) is often desirable, but it may not be possible or feasible (as when turnover is rapid). In such cases, training in transportable team competencies may be a viable option. Furthermore, there may be value in training these as task- or team-specific.

Knowledge Competencies

In this category, we hypothesize that team members must possess an understanding of the teamwork skills necessary for effective team performance. This provides the conceptual underpinnings required to execute crucial teamwork skills (that is, team members have knowledge that enables them to perform the necessary skills).

Skill Competencies

We hypothesize that several transportable team skills can affect team performance. These include interpersonal skills (morale building, conflict resolution, cooperation), communication skills (information exchange, consulting with others), and task motivation. All these skills are important to team functioning but are not specific to a task or a team. For example, employees can be trained in general conflict-resolution skills that are applicable to a wide range of team endeavors.

Attitude Competencies

Individuals who work in teams can also be hypothesized to require several team-related attitudes that are not specific to a particular team or task. For example, team members should possess a collective (versus egocentric) orientation and should appreciate the importance of teamwork for success. These attitudes may contribute to the performance of a team member across situations and teams.

Team Competencies and Team Training

Up to this point, we have made the case that team competencies can be conceptualized as having team- and task-specific or generic components. Using these concepts to begin specifying training requirements, we now offer sixteen propositions regarding the nature of the team training required for developing particular competencies in teams and regarding the strategies that

are likely to be successful. The propositions fall into two related categories: those that involve the manner in which environmental (task and situational) characteristics influence the nature of the team's competency requirements, and those that link the categories of team competencies to training requirements and strategies. After each proposition, we provide an explanation of our reasoning, based on the framework and associated ideas set forth in this chapter. It should be noted that these propositions are offered only as food for thought; we realize that many of them require further attention and systematic study.

Propositions Linking Situational or Task Characteristics to Team Competencies

PROPOSITION 1: *High interdependency in a team task requires team members to possess context-driven competencies.*

Greater interdependency in teams requires a greater reliance on teammates. Team members must shift their strategies in a coordinated manner, one that also permits teammates to execute their functions effectively. Theory about shared mental models suggests members of such teams must be able to anticipate the behavior of specific teammates through familiarization with task-specific teammate characteristics (as in anticipating when a teammate will require particular information). When task interdependence is relatively low, transportable teamwork competencies are probably sufficient, depending on the nature of other task or environmental factors.

PROPOSITION 2: *Teams that operate in an environment that is fairly stable require task-specific but not necessarily team-specific competencies.*

When a task is stable, it requires less behavioral discretion on the part of team members. This relaxes the necessity for team members to be familiar with particular teammates, because their responses will be defined by the task and can be expressed more easily as standard operating procedures. There-

fore, in such situations, team members must have competencies that are specific to the task for optimal performance. Low stability in task requirements would suggest that team members be familiar with one another, so as to be able to predict the behavior and requirements of teammates (team-specific competencies would be required).

PROPOSITION 3: *In teams where turnover is rapid, task-specific competencies are required and team-specific competencies are less crucial.*

It may not be fruitful to establish team-specific competencies for teams whose membership changes rapidly. Task-specific competencies — understanding the roles and role significance of different positions on the team, regardless of who occupies them — are crucial in such instances. When turnover is low, developing team-specific competencies is more logical. Task-specific competencies may also be appropriate for teams with low turnover; this will depend on other task and environmental factors.

PROPOSITION 4: *Team members who hold membership in multiple teams require, at the minimum, transportable team competencies.*

An employee who moves from one team to another would benefit from competencies that enable him or her to be an effective team member. In such a case, training transportable team competencies should improve performance across tasks and teams. More specific team or task competencies may also be required, however, as determined by the nature of the team situations in which the employee participates.

PROPOSITION 5: *When team members interact together across a variety of tasks, team-specific competencies are required; task-specific competencies may be less feasible (or necessary) to develop in such cases.*

In cases where team members perform together across a variety of tasks, effectiveness will be enhanced when the members are familiar with each other. Familiarity fosters coordination

and helps team members anticipate each other's behavior. When a team performs a single task, or only a few tasks, it may be fruitful to develop task-specific competencies as well.

Propositions Linking Team Competencies to Training Requirements and Strategies

PROPOSITION 6: *Teams that require team-specific competencies, whether they fall into the team-contingent or context-driven categories, will benefit from training as intact teams.*

Team-specific competencies are required when team members require an understanding of their teammates' characteristics (often to facilitate changes in task strategy). In order to develop these, team members must be given experience with their teammates so that they can learn about one another, and develop the necessary skills and attitudes.

PROPOSITION 7: *Teams that require task-specific competencies, whether they fall into the task-contingent or context-driven categories, should be allowed to practice in the actual task environment (or in one as close as possible).*

To optimize performance in a team that carries out a consistent task, team members will benefit from training that allows them to experience the actual task environment. This enables them to learn crucial task contingencies, develop accurate task models, and learn how to adjust task strategies in response to specific task demands.

PROPOSITION 8: *Training for teams that require team-specific competencies, in either the context-driven or team-contingent categories, should incorporate feedback that leads to shared or common expectations for task performance.*

Several lines of research suggest that members of an effective team share knowledge about the task and the team. Such knowledge can be developed during team training via feedback

and discussion among team members. In particular, encouraging team members to explain why they behave as they do in accomplishing the task should help teammates gain the necessary knowledge.

PROPOSITION 9: *When transportable competencies are required, some training can be focused at the individual level.*

Many of the kinds of knowledge, skills, and attitudes necessary to teamwork can be demonstrated and trained at the individual level (assertiveness, accurate task models, importance of teamwork). Other competencies may require training in a group or team setting (interpersonal skills, task sequencing, collective orientation), even though the teammates in training may not be the same as in the operational environment.

PROPOSITION 10: *Task simulation may be an effective training strategy for teams that require task-specific competencies requiring actual practice. Further, task simulation can be an effective means of imparting team-contingent competencies if the operational team members are allowed to practice together (and only under these conditions).*

When team members require exposure to the actual task, it is sometimes difficult to provide direct task experience (as when issues of safety or cost arise). Therefore, simulation of the task environment may be effective in these cases. Task simulation can be achieved in a variety of ways, from sophisticated flight simulators that replicate the cockpit to simpler personal computer-based games or tasks.

PROPOSITION 11: *Cross-training may be effective for teams that require exposure to the task (that is, task-specific competencies, whether they fall into the context-driven or task-contingent categories).*

When team members must understand the roles and responsibilities of other team positions, cross-training can help develop this knowledge by exposing team members to other

positions. In particular, cross-training can provide team members with accurate expectations for the task by showing them what other positions require. Cross-training may include job rotation or simply letting team members train in each other's roles for some period of time.

PROPOSITION 12: *Positional knowledge training may be useful for teams with task-specific competency requirements, either context-driven or task-contingent.*

Knowledge about the roles and responsibilities of teammates is required when team members are performing a specific task together. Such training, which may be as simple as providing team members with information about their teammates' roles, gives team members an understanding of how their jobs fits into the overall team task.

PROPOSITION 13: *Training to impart context-driven competencies should include guided practice that exposes the actual team members to the variety of situations they may confront on the job. When the actual team cannot be trained intact, guided practice may be useful as a means of training task-specific (but not team-specific) competencies.*

Research suggests that unguided practice may not lead to effective performance (Frederiksen & White, 1989). However, guided practice—allowing the team to practice while being monitored and given feedback by instructors—may be an effective training strategy for context-driven competencies. This is particularly true if the guided practice is designed to lead the team through a series of situations they are likely to confront on the job.

PROPOSITION 14: *Lecture-based training may be appropriate for transportable competencies but should be considered only as a first step for other types of competencies, since these require experience with the actual task or team.*

Training for context-driven or task-contingent competencies requires experience with the task. As an initial means of imparting knowledge, however, lectures are probably useful for all categories of competencies. For transportable competencies, lecture-based training may even suffice.

PROPOSITION 15: *Role playing may be used effectively to train team-contingent competencies when it involves the actual (operational) team.*

By interacting with one another in role-playing situations, team members can learn each other's knowledge, skills, abilities, and preferences. This information increases the probability that team members will develop accurate expectations for their own performance and the performance of teammates. When the intact team is not available, role playing may be useful for developing task-contingent competencies if trainees are allowed to use role playing in situations they are likely to confront in the actual task.

PROPOSITION 16: *Passive demonstrations of the task may be an effective means of training task-contingent competencies.*

In attempting to build a procedural knowledge base in trainees, it may be useful to demonstrate task processes, to show where and how inputs are made by various team positions. This may be accomplished with flow diagrams or computer animation. Passive demonstrations may be an effective way to train team members on sequencing task inputs and accomplishing task procedures, for example.

Implications for Training Design

We hope that the ideas put forth in this chapter can be used to stimulate thinking about how to train various types of teams. Echoing the line of reasoning presented thus far, we contend that the specification of training requirements should rest on

an analysis of the nature of the competencies required by the team (that is, it must be established whether a team requires context-driven, team-contingent, task-contingent, or transportable team competencies). In fact, the competencies shown in Table 10.2 can be used to guide a traditional needs analysis (Wexley & Latham, 1981). For example, a person analysis could be tailored to look for the competencies listed in Table 10.2; a task analysis could be conducted to establish the kinds of competencies required for task success. Once the competency requirements for a team are established, the next step in specifying appropriate training strategies is to link competency requirements to specific training characteristics. We have taken a first step in this direction with our sixteen propositions, summarized in Table 10.3. The far-left column of the table delineates some of the factors that we hypothesize as moderating the nature of team competencies. This is not an exhaustive list but serves to highlight some of the important variables. The third and fourth columns summarize our ideas about relationships among team competencies, requirements, and training strategies. The table is best considered as a first step toward theoretically based guidelines for thinking about and designing training for various types of teams in industry.

Conclusion

In this chapter, we have attempted to bridge the gap between several areas of theorizing and investigation in the area of team training. The conceptual framework offered here is designed to make explicit the various team competencies that must be trained in order to achieve effective team performance. We used it as a basis of structuring a brief review of the literature and establishing the specific competencies required for various types of teams. We then elaborated on the nature of team competencies and linked these to task and situational factors. Finally, we attempted to match competency requirements with recommended training methods.

From the standpoint of research, we have offered sixteen propositions about the nature of team competencies and how

Table 10.3. Summary of Propositions for Training Design.

<i>Task/ Environmental Factor</i>	<i>Level</i>	<i>Nature of Required Competencies</i>	<i>Training Strategies</i>
Task interdependence	High	Context-driven	Task simulation (intact team) Cross-training Guided task practice (intact team) Role playing (intact team)
	Low	Transportable	Lecture Passive demonstration
Task/ environmental stability	High	Task-contingent	Task simulation Cross-training Guided task practice Role playing Passive demonstration
	Low	Team-contingent	Task simulation (intact team) Guided task practice (intact team) Role playing (intact team)
Team member turnover	High	Task-contingent	Task simulation Cross-training Guided task practice Role playing Passive demonstration
	Low	Team-contingent	Task simulation (intact team) Guided task practice (intact team) Role playing (intact team)
Membership in multiple teams	High	Transportable	Lecture Passive demonstration
	Low	Team-contingent	Task simulation (intact team) Guided task practice (intact team) Role playing (intact team)
Variety of tasks performed by team	High	Team-contingent	Task simulation (intact team) Guided task practice (intact team) Role playing (intact team)
	Low	Task-contingent	Task simulation Cross-training Guided task practice Role playing Passive demonstration

these can best be trained. These propositions are easily stated as testable hypotheses or research questions. From a more practical standpoint, we have provided a structure in which guidance for practitioners can be couched and have attempted to pull together state-of-the-art knowledge regarding how best to train various types of teams. We hope that both communities will be stimulated by our thinking, so that our understanding of this crucial area can continue to evolve.

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11

CONCLUSION: COMMON THEMES AMONGST THE DIVERSITY

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What is the state of research and theory on team decision making and team performance as represented in the foregoing chapters? To some extent, it may seem that we are still feeling the elephant: different researchers grasp and examine different parts of the elephant, each examination yielding a distinctive account of the nature of the beast. But teams working in organizations are not pachyderms and, unlike the proverbial blind men, we describe teams neither in simple terms nor with data from only one sense. Indeed, the chapters of this book communicate substantial understanding of teams making decisions at work.

We know a lot. We have gained that knowledge by using diverse methods of research (experiments, observations, simulations), by studying a wide variety of teams and organizations, by studying phenomena relevant to entities other than just groups (stress, information processing), and by studying individuals. This book's chapters reflect that diversity.

It would seem, too, that the preceding chapters indicate that we are poised to learn a lot more about teams, their decision making, and their effectiveness in organizations. What we