Chapter 2. Training Teams

Definitional Issues Concerning Teams and Teamwork

Teams and teamwork strategies have received an increased amount of attention over the past 20 years.[6–10] Numerous articles and books have specifically addressed issues critical to team performance.[7, 9, 11–14] In fact, organizations that do not rely on teams—at least to some extent—are scarce.

The research literature reflects the prevalence of teams in the workplace, with a substantial agreement as to their defining characteristics. Inconsistencies in the various definitions are due, at least in part, to the reality that the team concept serves a variety of purposes (e.g., learning, producing a product, solving problems, gaining acceptance), it takes on numerous forms (e.g., virtual, co-located), it is adjustable in its size, and equally versatile in its longevity (e.g., *ad hoc*, long term).[15]

What is a "Team"?

We reviewed several often-cited definitions of a team, as well as other relevant literature, to identify the key features for the purposes of this project.[7, 16–18] The definition we adopted is the embodiment of these five characteristics:

1. Teams consist of two or more individuals.

2. Team members have specific roles, perform specific tasks, and interact or coordinate to achieve a common goal or outcome.[7, 18, 19]

3. Teams make decisions.[20]

4. Teams possess specialized knowledge and skills and often function under conditions of high workload.[20–22]

5. Teams differ from small groups in that teams embody a collective action arising out of *task interdependency*.[23] Teamwork characteristically mandates an adjustment on the part of team members to one another, either sequentially or simultaneously, in an effort to accomplish team goals.[24]

Examples of teams that fit this definition include military command-and-control teams, aircraft flight crews, police SWAT teams, fire/rescue teams, and management teams. This same definition also is applicable to health care providers, describing medical emergency teams,

intensive care units, labor and delivery units, neonatal care units, and operating room teams, to name a few.

Defining the essence of a "team" is a necessary first step in the creation of a value system that reflect team inputs, team processes, and team outcomes. In turn, these same quantifiable values provide a framework of principles on which any specific training program is based, and against which the program's effectiveness will be assessed.

The Nature of Effective Teamwork

Teamwork is traditionally described using systems theory, which posits that team inputs, team processes, and team outputs are arrayed over time. Team inputs include the characteristics of the task to be performed, the elements of the context in which work occurs, and the attitudes brought forth by its members to a team situation. Team processes are the interactions and coordination necessary on the part of team members to achieve specific goals. Team outputs consist of the products derived from the team's collective efforts.[25–27] Thus, teamwork occurs in the process phase, during which designated members interact and collaborate to achieve the desired outcomes. Finally, teamwork does not require team members to work together permanently; it is a sustained effort performed using a shared set of teamwork skills, not by permanent assignments that carry over from day to day.[28]

Conversely, the installation of a team structure in an organization does not automatically result in effective teamwork. Effective team performance requires a willingness on the part of team members to cooperate in the service of a shared goal, such as the goal of improving patient safety and the creation of a treatment environment free from medical errors. Moreover, effective teamwork depends on effective communications within the team, along with adequate organizational resources and support. In short, teamwork requires a shared acknowledgement of each participating member's roles and abilities. Without this acknowledgement, adverse outcomes may arise from a series of seemingly trivial errors that effective teamwork could have prevented.

Extensive research has yielded numerous models of effective teamwork.[29–33] Historically, the literature focused on the identification of generic teamwork skills associated with most teams. That focus has shifted more recently, however. Newer studies seek to identify the specific competency requirements exhibited by individual team members.[21, 31, 34] Although the term *competency* holds a variety of meanings, it is generally used to denote the qualities needed by a jobholder.[35] More specifically, Parry[36] defined *competencies* as a cluster of related knowledge, skills, and attitudes that (1) affect a major part of one's job (i.e., one or more key roles or responsibilities); (2) correlate with successful job performance; (3) can be measured against well-accepted standards; and (4) can be improved through training and development.

Generally speaking, team competencies are the attributes team members need to possess, if they are to engage successfully in teamwork. Cannon-Bowers and colleagues[21] further suggest, "… It is essential to understand the nature of competencies required to function in a team as a means to define selection criteria, design and conduct training, and assess team performance." The researchers identified three types of competencies that are critical for effective teamwork: (1) teamwork-related knowledge, (2) teamwork-related skills, and (3) teamwork-related attitudes. Table 1 lists and defines primary competencies in each of these categories.

Table 1. Primary teamwork competencies

Knowledge competencies	
Competency	**Definition**
Cue/strategy associations	The linking of cues in the environment with appropriate coordination strategies.
Shared task models/situation assessment	A shared understanding of the situation and appropriate strategies for coping with task demands.
Teammate characteristics familiarity	An awareness of each teammate's task-related competencies, preferences, tendencies, strengths, and weaknesses.
Knowledge of team mission, objectives, norms, and resources	A shared understanding of a specific goal(s) or objective(s) of the team as well as the human and material resources required and available to achieve the objective. When change occurs, team members' knowledge must change to account for new task demands.
Task-specific responsibilities	The distribution of labor, according to team members' individual strengths and task demands.
Skill competencies	
Mutual performance monitoring	The tracking of fellow team members' efforts, to ensure that the work is being accomplished as expected and that proper procedures are followed.
Flexibility/adaptability	The ability to recognize and respond to deviations in the expected course of events, or to the needs of other team members.
Supporting/back-up behavior	The coaching and constructive criticism provided to a teammate, as a means of improving performance, when a lapse is detected or a team member is overloaded.
Team leadership	The ability to direct/coordinate team members, assess team performance, allocate tasks, motivate subordinates, plan/organize, and maintain a positive team environment.
Conflict resolution	The facility for resolving differences/disputes among teammates, without creating hostility or defensiveness.
Feedback	Observations, concerns, suggestions, and requests, communicated by team members in a clear and direct manner, without hostility or defensiveness.
Closed-loop communication/information exchange	The initiation of a message by a sender, the receipt and acknowledgement of the message by the receiver, and the verification of the message by the initial sender.
Attitude competencies	
Team orientation (morale)	The use of coordination, evaluation, support, and task inputs from other team members to enhance individual performance and promote group unity.
Collective efficacy	The belief that the team can perform effectively as a unit, when each member is assigned specific task demands.
Shared vision	The mutually accepted and embraced attitude regarding the team's direction, goals, and mission.

Table 1. Primary teamwork competencies (continued)

Team cohesion	The collective forces that influence members to remain part of a group; an attraction to the team concept as a strategy for improved efficiency.
Mutual trust	The positive attitude that team members have for one another; the feeling, mood, or climate of the team's internal environment.
Collective orientation	The common belief that a team approach is more conducive to problem solving than an individual approach.
Importance of teamwork	The positive attitude that team members exhibit with reference to their work as a team.

Teamwork-related Knowledge

Team knowledge competencies are the principles and concepts that underlie a team's effective task performance. Broadly speaking, selected members should know the range of skills required, when particular behaviors are appropriate, and how the skills and behaviors are manifested in a team setting, if they are to function as a team. Furthermore, each member should know the team's mission and goals, as well as an awareness of each member's roles and responsibilities in achieving them. This shared knowledge enables team members to better communicate and coordinate the different tasks they need to accomplish, thereby achieving successful team performance.

Teamwork-related Skills

Team-skill competencies, defined by Cannon-Bowers and colleagues as the learned capacity to interact with other team members at some minimal level of proficiency, have received considerable research attention. But the same scientists contend the spectrum of literature regarding skill labels and definitions is confusing, contradictory, and plagued with inconsistencies.[21] Across studies, different labels are used to reference the same teamwork skills, while identical labels are used to describe different skills.

Our study recommendations will address the necessity of developing a standard competency nomenclature, in an effort to mitigate this confusion in future research. For example, in an attempt to resolve earlier inconsistencies, Cannon-Bowers and colleagues found that 130 skill labels could be sorted into eight major categories: adaptability, situation awareness, performance monitoring/feedback, leadership, interpersonal relations, coordination, communication, and decisionmaking. Previous investigations have shown these skills to be directly related to effective team performance.

Nevertheless, a number of investigations have demonstrated the difficulty of measuring more than four distinct skill competencies during scenario-based training.[39–41] In light of this finding, the best skills to include in an assessment are those that are crucial, teachable and measurable. One research study exemplifying this principle[42] involves the identification of four teamwork skill competencies related to the performance of air traffic control (ATC) teams—information exchange, supporting behavior, team feedback skill, and flexibility. A subsequent study by the same research group[41] reliably and accurately measured these competencies during Navy combat-information-center team-training scenarios.

Teamwork-related Attitudes

Team attitude competencies have been defined as internal states that influence a team member's decision to act in a particular way.[21, 43] Positive attitudes toward teamwork and a mutual trust among team members are critical to successful team processes.[44–46]

For example, Vaziri and colleagues[47] found that higher levels of mutual trust among team members led to a more harmonious and productive team environment. A later study[6] reported a difference between independent-minded members of a team, who tend to equate success with competition, and group-oriented team members, who tend to endorse the opposite view. In this study, the group-oriented team members performed a team decisionmaking task significantly better than did their independent-minded peers because of the labor-sharing benefits of teamwork. Furthermore, the group-minded workers were permitted to consider other team members' behavior and believed that a team approach was superior to a solo approach. Thus, as Eby and Dobbins suggest, membership in a team (i.e., a collective orientation) contributes to a positive team attitude.[48]

Contextual Factors

Effective teams do not function in a vacuum. Tannenbaum and colleagues[49] have proposed an integrative model of team effectiveness that includes individual characteristics (e.g., ability, motivation) and team characteristics (e.g., power distribution, cohesiveness) relevant to successful team performance. It should be noted that this model also takes into consideration the importance of organizational characteristics**,** such as reward systems and organizational climate; task characteristics**,** such as task type; and work structure characteristics**,** such as team norms.

Summary

In summary, teams know things, do things, and experience things; moreover, they know, do, and experience within the context of specific environments. A team's utility and efficiency is tied directly to its team members and their ability to integrate various personal and situational characteristics. Each team member must understand the technical and tactical considerations of the assigned task, as well as the strengths and weaknesses of his or her teammates. In addition to carrying out their own responsibilities and altering them when necessary, all members also must monitor their teammates' activities and diffuse potential team conflicts. Effective teams exhibit these competencies while maintaining a positive emotional attitude toward the team itself.

Training Teams

Team training could be described as the application of instructional strategies based on well-tested tools (e.g., simulators, lectures, videos) to a specific set of competencies.[50, 51] Effective team training reflects general learning theory principles, presents information about requisite team behaviors, affords team members the necessary skills practice, and provides them with remedial feedback.

Much research has been devoted to effective strategies and techniques for training specific team knowledge, skills, and attitude competencies. A comprehensive review of this research has resulted in an extensive collection of principles and guidelines concerning the design and delivery of team training. For example, guidelines exist for assertiveness training, cross-training, stress-management training, and team self-correction.[41, 52– 54]

The team competencies presented in Table 1 are a useful supplement to the team-training research and practical guidance, in the design of team-training programs. Cannon-Bowers and colleagues contend that team knowledge, skill, and attitude competencies should serve as the starting point for training needs analyses.[21] Trainers then must specify appropriate training strategies, as their second priority. To meet this requirement, Cannon-Bowers and colleagues offer detailed information on the development of particular team competencies and strategies that are likely to be successful. For example, they suggest that groups employing team-specific competencies should train as intact teams. Furthermore, this training should include a feedback component that encourages team members to share their task-performance expectations. Team members also should be encouraged to explain the rationale behind their behaviors, as they perform specific tasks. Such strategies provide useful insight into the way each team member processes information, while enabling their peers to better predict one anothers' behavior and information needs.

Finally, the success of a team-training program depends on more than the development of team members' knowledge, skills, and attitudes. For example, the influence of organizational factors above and beyond a training program mandates a needs analysis be conducted to determine the best delivery method or instructional strategy for a given training intervention. In addition, training aides, such as outlines, diagrams, graphic organizers, may be used in conjunction with preparatory information, prepractice briefs, attentional advice, goal orientation, and meta-cognitive strategies, for additional practice opportunities.[55] Table 2 provides an overview of various strategies, each matched with the most appropriate level of training.

Table 2. Individual and team-level training strategies

Strategy	Definition	Level	Sources
Assertiveness training	Uses behavioral modeling techniques to demonstrate both assertive and nonassertive behaviors; provides trainees with practice and feedback opportunities.	Individual	Smith-Jentsch, et al, 1996
Meta-cognitive training	Develops those skills that regulate cognitive thinking abilities, such as inductive and deductive reasoning.	Individual	Jentsch, 1997
Stress Exposure Training (SET)	Provides coping strategies to help trainees better respond to various stressors.	Individual and team	Driskell, Johnston, 1998
Simulator training	Reproduces in a classroom environment the same conditions, equipment, and performance demands that trainees will experience on the job.	Individual and team	Salas, Dickinson, Converse, et al, 1992
Team training	Provides interventions that (a) convey information; (b) demonstrate teamwork behaviors and skills; (c) encourage practice, and; (d) include feedback to help trainees achieve the necessary proficiencies, at the individual and team levels.	Team	(a) Salas, Cannon-Bowers, 2000; (b–d) Salas, et al, 1997

Table 2. Individual and team-level training strategies (continued)

Cross-training	Trading roles and tasks among team members, so that each may develop a better appreciation and facility for coworkers' responsibilities and overall team goals.	Team	Salas, et al, 1997; Volpe, Cannon-Bowers, Salas, et al, 2001
Team coordination training/Crew Resource Management	Training to improve task management skills and communication (both explicit and implicit), to encourage backup behaviors, and to provide practice opportunities for members of a particular workplace community.	Team	Entin, Serfaty, 1999; Bowers, Blickendersfer, Morgan, 1998
Team building	Focuses on improved role clarification, goal-setting exercises, problem solving skills, and interpersonal relations.	Team	Salas, Rozell, Mullen, et al, 1999
Self-correction training	Helps individuals and teams monitor, evaluate, and revise deficient behaviors, through instructive feedback.	Individual and team	Smith-Jentsch, et al, 1998; Blickensderfer, Cannon-Bowers, Salas, 1997

We turn now to a brief description of some of the most commonly used training strategies. A thorough training program might incorporate multiple methodologies.

Simulator-based Training

The similarity of the training environment to the actual conditions under which the team will perform is an important factor in team training design. Training environments should reflect one or more of three conditional elements: stimulus fidelity (i.e., trainees are exposed to the same "behavioral trigger" they will experience on the job); response fidelity (i.e., trainees react to triggers with the same behaviors that they will perform on the job); and equipment fidelity (i.e., trainees use the same materials and equipment that they will use on the job).[18] Simulator training is especially well-suited to medical fields like surgery, emergency medicine, neonatal care, etc., because the realism of the training environment closely mirrors the work environment. In fact, some researchers suggest that training be conducted under the same stressful operating conditions that the team will encounter in the field.[54]

Realistic simulations do not translate directly to training effectiveness. But the best simulations reproduce realistic tasks and afford trainees the sort of practice that enhances learning.[56] Simulators also allow users the opportunity to practice both team- and task-related skills. Context-specific information, imbedded within the simulations, cue specific learned behaviors in the trainees. In addition, simulators provide opportunities for feedback on the actions, activities or strategies performed or overlooked by team members. Simulation training also benefits training instructors, enabling them to identify performance decrements and particular situations in which further training is needed.

Finally, a strategy that might be considered a subset of simulation training—scenario-based training (SBT)/event-based approach to training (EBAT)—has been shown to improve the performance of individuals and teams working in technology-rich environments. SBT/EBAT presents the training exercise itself as the curriculum, and is based on the systematic linkage aspects of scenario design, development, implementation, and analysis. It relies on controlled exercises or vignettes, in which the trainee is presented with cues that are similar to those found

in the actual task environment. The SBT/EBAT training objectives are accomplished by embedding specific "trigger" events into the scenario or exercise, and trainees receive feedback reflective of their responses.

The primary goal of SBT/EBAT is to provide trainees with critical competencies, developed through practice in simulated environments modeled on actual operational conditions, and feedback linked to specific training events. SBT/EBAT has been tested empirically and demonstrated in a variety of team-training environments.[57, 58] This scenario- or vignette-based technique shows great promise as a strategy for training care providers who must coordinate their efforts—especially in environments with multiple patient safety threats (e.g., emergency rooms, intensive care units).

Team Coordination Training

Another widely used strategy for training groups of workers is team coordination training (TCT). TCT emphasizes the basic processes underlying teamwork and typically involves several team skills necessary for a successful outcome in a particular performance environment. This type of training usually is delivered by means of a combination model, using formal instruction, demonstrations (e.g., video examples), and practice-based methods (e.g., role-playing). Research supports its effectiveness in measures of positive reactions, enhanced learning, and behavioral change.[9, 39] When used in the aviation industry, this strategy also is referred to as Crew Resource Management (CRM) training. CRM (to be discussed more throughly in the next chapter) is a family of instructional strategies that seeks to improve teamwork in the aircraft flight deck setting through the introduction of simulators, lectures, and videos targeting specific content (i.e., teamwork knowledge, skills, and attitudes).[38] Additionally, CRM has served as a model for much of the existing medical-team training.

Team Self-correction Training

The previous three training methods noted here—self-correction training, cross-training, and stress-exposure training—each involve strategies that trainers can incorporate at their discretion. Self-correction is a naturally occurring process for effective teams. It often occurs at a meeting following a performance episode and involves discussions of individual and team errors, as well as tactics for preventing the same errors in the future. As this process focuses on error identification and correction, it has particular relevance to medical team performance in a patient safety context.[59]

Self-correction training—delivered through a combination of lectures, demonstrations, practice, and feedback—analyzes the error identification and correction process and trains teams to practice it. Team members learn to observe their collective performance, categorize effective and ineffective behaviors, and present them in a structured format. They can then evaluate each aspect of the performance and provide one another with constructive feedback.[55] When guided by a competent instructor, this method of team training has been demonstrated to improve team performance.

Cross-training

Cross-training exposes team members to the basic tasks, duties, and responsibilities of their peers, and is intended to promote coordination, communication**,** and team performance. Ideally, this training alleviates the decline in performance that is likely to follow personnel changes; it has the secondary benefit of improving implicit coordination (i.e., directing various activities without the need for explicit communication). The training is centered on shared cross-role information (teammates, task, equipment, situation); enhanced understanding of the team members' roles, responsibilities, and interdependencies; and cross-role task practice and feedback. Research has demonstrated that cross-trained teams better anticipate the informational needs of their teammates, commit fewer errors, and display a higher quality of team process, compared with their counterparts who were not cross-trained.[53] Again, these advantages are germane to medical teams and their performance in a manner conducive to patient safety.

Stress-exposure Training

Stress can be a considerable negative influence on individual or team performance, especially in high-stress environments characterized by ambiguous goals and severe time limitations (e.g., military operational environment, medical emergency departments). Stress-exposure training (SET) emphasizes a three-phase methodology designed to reduce the debilitating effects of stress through trainee instruction, skills training, and practice. SET improves performance by providing a safe-but-stressful training environment similar to that in which the users will work. There, skills are practiced under graduated exposure to different stressors. Documented SET outcomes include reduced anxiety in stressful situations, increased confidence, and improved cognitive and psychomotor performance under stress.[54] Given the life-altering nature of decisions routinely required of emergency medical teams, successful stress coping would seem to be an especially pertinent skill for these care providers.

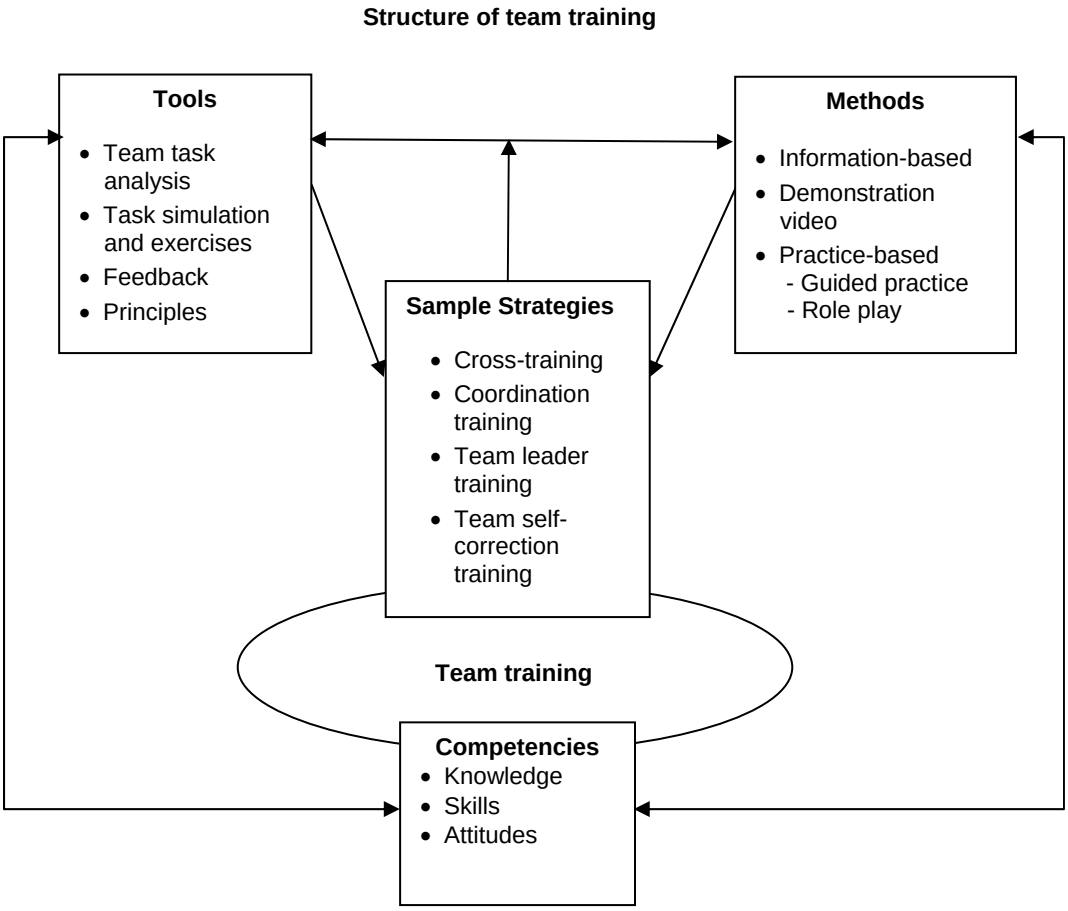
Meta-cognition Training

Finally, meta-cognition training teaches team members to monitor and modify their decisionmaking processes, rather than focusing on the outcomes of individual decisions. Such training develops reasoning and problem-solving strategies applicable to the challenges encountered by the team. This strategic aspect of decisionmaking is particularly useful in managing stressful situations.[60]

Methodology Conclusions

As our discussion of the aforementioned strategies demonstrates, team training is not a destination; rather it is a journey and an intervention based upon sound instructional principles and carefully crafted instructional strategies. Figure 1 provides an overarching framework that illustrates the factors necessary to the design and delivery of an effective training program.[55]

Figure 1. Framework for designing an effective team training program*



*Adapted from Cannon-Bowers, Salas[55]

Summary

Well-organized and high-performing teams exhibit a sense of collective efficacy. Their members recognize a dependence upon one other, and share the belief that they can solve complex problems by working together. Moreover, effective teams are dynamic: the members optimize their resources, engage in self-correction, compensate for one another with back-up behaviors, and reallocate functions as necessary. Because they often can coordinate without overt communication, effective teams can respond efficiently in high-stress, time-restricted environments. Finally, effective teams possess the means to recognize potential difficulties or dangerous circumstances and adjust their strategies accordingly.

To design training strategies that will improve teamwork skills on the job is a challenge. Teams operate in complex and dynamic environments that are characterized by multi-component decisions, rapidly evolving and ambiguous situations, information overload, severe time constraints, and harsh consequences for mistakes.

Yet team training is charged with improving trainee competencies (e.g., knowledge, skills, attitudes) and achieving desirable performance outcomes (e.g., timely and accurate response, reduced patient safety risks, improved quality of care) under these demanding conditions. This chapter makes the argument that effective training programs (1) blend evidence-based theory with a thorough needs analysis; (2) provide trainees with information, demonstrations, guided practice and timely diagnostic feedback; and (3) reflect organizational cultures that encourage the transfer of the trained competencies to the task environment.