Team Learning in Organizations: A Review and Integration

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A team of medical professionals adopt a new form of technology that greatly reduces the patient recovery period (Edmondson, 2003; Edmondson, Bohmer, & Pisano, 2001). An aircraft carrier crew routinely responds to changing situations that require accurate and timely information and communication (Weick & Roberts, 1993). A group of managers must determine how to bridge cultural, geographic and temporal distance to work together to achieve their goals (Gibson & Vermeulen, 2003). While these examples represent diverse occupations, tasks, and outcomes, they do have one element in common. Each provides an example of team learning in organizations. Organizations rely on team learning to solve complex problems, create new knowledge, and to improve the performance of ad-hoc or task specific project teams. Conversely, failures in learning often stifle the ability of organizations to perform (Kayes, 2004). As the above cases illustrate, team learning is no longer relegated to the classroom but is essential to the success of organizations.

Team learning takes on special importance as organizations move to meet the demands of knowledge work. Despite the growing importance of team learning little is known about the mechanisms by which teams learn. In his influential book on organizational learning published over 15 years ago, Peter Senge (1990) expressed the lack of a comprehensive understanding of team learning ". . . team learning remains poorly understood. Until we can describe the phenomenon better, it will remain mysterious. . . . mastering team learning will be a critical step in building learning organizations (p. 238)".

We have learned much about team learning in the subsequent years. Scholars have identified antecedents to team learning such as psychological safety (Edmondson, 1999), sub-group strength (Gibson & Vermueulen, 2003), cooperation (Tjosvold, Yu, & Hui, 2004) and cognitive ability (Ellis, et al., 2003). We also have ample research on team learning outcomes. For example, research suggests that team learning impacts organizational learning (Chan, Lin & Keasberry, 2003), the speed of technology implementation (Edmondson, 2003), and new product development (Sarin & McDermott, 2003). However, there are still unanswered questions. Recently, Edmondson (2002)

commented that "Although there is an emergent literature on team learning, we know little about how organizations change, or fail to change, through adaptive processes carried out by teams (p. 128)." For example, there remains a lack of clarity about the relationship between cognitive and social learning processes and how they manifest themselves into team learning. We are unclear about whether team learning occurs in the moment or develops over time and we are still unsure of what mechanisms go into developing the environment of psychological safety that fosters team learning.

This paper seeks to provide an answer to such questions by making sense of the growing and diverse literature on team learning. We present an integrated model of team learning and suggest its relationship to performance. This article: (1) examines current thinking on team learning, and (2) provides a conceptual model integrating knowledge and research on team learning from diverse fields. The model draws on general systems theory which reflects a rich tradition of using input-process-output (IPO) models to organize team processes (Hackman, 1987). We focus on the internal processes of team learning as a process of knowledge creation (Kayes, Kayes & Kolb, 2005) that leads to improved organizational performance. A comprehensive understanding of team learning in organizations serves to guide future research and to assist practice in fostering team learning through the acquisition of necessary skills and adoption of norms to realize effective team work.

The ultimate aim of this work in progress is to further clarify team learning to foster further study and theory development about the nature of team learning as a distinct, yet interrelated organizational function.

Team Learning in Organizations

Learning contributes to organizational effectiveness by enabling teams to create knowledge between team members, create knowledge with others external to the team, and to interact with the environment to enable adaptation to changing situations. Team learning leads to improved performance within the team which is further translated into organizational performance.

We argue that learning involves interaction amongst team members, with others external to the team, and with the environment. We suggest that these processes are what

lead to improved team and organizational performance. Our thinking is consistent with Van Der Vegt and Bunderson (2005), who found that research and development teams in the Norwegian oil and gas industry that were able to critically ask questions and examine their work processes improved their performance.

Insert Table 1 Studies of team learning about here

As can be seen in Table 1, the literature on team learning emerged as an interdisciplinary effort drawing on knowledge from diverse fields of study including: education (Hertz-Lazarowitz & Miller, 1992) management and organizations (Edmondson, 1999), adult learning (Kasl, Marsick and Dechant, 1997), and psychology (Moreland, 1999; Wegner, 1986). Numerous scholars emphasize team learning as a process (Van De Vegt & Bunderson; 2005; Kasl, Marsick & Dechant, 1997; Edmondson 2003, 1999; Gibson & Vermeulen, 2003). In particular, research has focused on the specific behaviors comprising team learning such as knowledge acquisition and application (Sole & Edmondson, 2003b), experimentation (Gibson & Vermeulen, 2003), and asking questions and seeking feedback (Edmondson, 1999). Research also notes the importance of cognitive aspects of team learning. For example, Edmondson (2003, 2002, 1999) includes reflective thinking in her definitions of team learning. Additionally, Tjosvold, Yu and Hui (2004) focus on reflection of undesired effects as a means to reduce the likelihood of future occurrence. Prior research has also identified several activities such as team leader coaching (Edmonson, 1999), cooperating (Tjosvold, Yu & Hui, 2004), and seeking and providing information (Neufeld & Haggerty, 2001) that are positively related to team learning.

Dimensions of Team Learning

A review of team learning literature reveals that team learning has been conceived along five dimensions.

Degree of Change

Team learning can be seen as either evolutionary or revolutionary in the degree of change. Many models, such as the developmental models, views change as a function of slow progressive learning (Tuckman, 1965). On the other hand, the revolutionary perspective suggests that team learning occurs in a punctuated fashion and learning creates immediate and dynamic changes in beliefs and behaviors of a team (Gersick, 1988).

Permeability

Team learning has been discussed relative to the degree of permeability. Permeability describes the degree to which team learning is viewed as having an important and lasting impact on groups or whether learning is viewed as having only a temporary and insignificant impact on teams. For example, Wegner (1987) describes learning as a function of specific relationships, thus, the implication is that learning is a product of constantly shifting relationships and memory. Wegner views team learning as a high permeability activity. Others view learning as a function of team norms which tend to be more stable over time.

Source of Variance

Some conceptualizations of team learning rest on assumptions that learning emerges from within team variance, where individual team members bring experiences of diversity that contributes to team learning. For example, Kayes, Kayes and Kolb (2005) view team learning as a function of individual experience and how that experience interacts within the team. Others have viewed team learning from the perspective of within team agreement. Consistent with the team norms perspective, where team learning is viewed as a relatively stable measure of teams, team learning can be seen as a set of shared beliefs and behaviors within a team.

Nature of Knowledge

A common interest of those who study learning is the distinction between subjective and objective knowledge. This interest in knowledge reflects a general concern with epistemology in the study of learning more generally. The distinction between subjective and objective knowledge is reflected in the various methodologies used to study team learning. For example, Weick and Roberts (1993) view learning as a function of coordination of subjective cognitive processes, whereas Edmondson tends to view knowledge from an objective viewpoint as evidenced by the nature of the outcome variables measured. The nature of knowledge is closely linked to the conceptualization of learning as either a process or an outcome.

Process versus Outcome

There has been some disagreement in the literature over whether learning is a process or an outcome although much of the empirical quantitative research tends to conceptualize learning as a behavior or process that leads to improved performance outcomes. In order to develop an understanding of learning that is both broad and deep, it may be helpful to distinguish team learning from related concepts such as individual learning, group development and team performance.

The Uniqueness of Team Learning

Individual versus Team Learning

Team learning can be distinguished from individual learning because team learning occurs when one person is engaged with or coordinating with another person or persons. Unlike individual learning, team learning requires individuals to share experiences with other team members (Kayes, Kayes & Kolb, 2005). Team learning occurs when individuals coordinate knowledge and behaviors in order to reach a team goal. As a social process, team learning differs from individual learning in that it requires interaction and coordination between individuals. Specifically, these individuals are members of groups that 1) work interdependently on a common task or objective, 2) have defined boundaries, and are 3) identified with a team which is also recognized as such by

others (Hackman, 1987). Whereas individual learning relies more specifically on cognitive, emotive and behavior of individuals, team learning emerges as cognitions, emotions and behaviors are shared among individuals. Exposure to individuals with different expertise and experience is a vital source of team learning. Interaction with dissimilar others promotes learning by exposing actors to new paradigms and by enabling the cross-fertilization of ideas (Van DerVegt, Bunderson, & Stuart, 2005). The more these aspects of learning are shared, the more the team, rather than the individual, can be said to be learning (see Edmondson, 1999).

Team learning can be distinguished from individual learning because team learning:

1) involves the interaction amongst team members related to gathering, sharing, processing, and acting on knowledge,

2) requires a level of agreement among team members about acceptable patterns of behavior for knowledge sharing,

3) results in performance improvement (or deterioration) for the team that result from this interaction.

Learning versus Performance

Team learning needs also to be distinguished from team performance. This distinction comes in many forms. First of all, team learning is typically conceived as a process that predicts or contributes to team performance. For example, a major focus of team learning research is in determining its impact on team performance directly and organizational performance indirectly. For example, Bunderson and Sutcliffe (2005) examined management teams in a consumer products company and found that a climate of proactive team learning is positively associated with performance. However, they do note the possibility that learning does not always lead to improved effectiveness. In particular, they found that high performance intact teams that intensively focus on learning early are likely to compromise team execution in the short-term. This may be due to the increased time required to identify, acquire, experiment and integrate new sources of information as well as revisiting current processes and procedures that to date have proven successful. These findings challenge scholars to further identify and

understand the exact contextual elements that influence the relationship between team learning and performance.

One way to distinguish team learning from performance lies in the nature of the context. First, team learning focuses on generating new strategies to solve problems where performance focuses on maintaining or in some case improving upon existing strategies. Similarly, team learning has a low reliance on prior success strategies where team performance relies heavily on prior team task strategies. Team learning requires a different focus on the nature of goals. Team learning often focuses on dealing with multiple goals which exist at the individual and team level while team performance attempts to improve upon reaching a single team goal. In terms of goal complexity, team learning exists when teams confront multifaceted and complex goals; whereas, team performance tends to focus on tasks of complexity. Team learning occurs as teams confront problems and need to establish new and better work processes to solve those problems. In contrast, team performance focuses on maintaining or improving established work processes. Finally, team learning tends to dominate when the need for adaptability is high and the definition of goals broad and team performance tends to dominate when the need for adaptability is low and goals are narrowly defined (Kayes & Kayes, 2006; Kayes, 2006).

In summary, team learning can be distinguished from team performance in at least 3 ways because team learning:

1) is an antecedent to performance and describes the processes that lead to performance.
2) outcomes differ from the narrow outcomes often associated with performance to include knowledge creation
3) often rests on different assumptions about the nature of knowledge and the environmental demands.

Learning versus Development

Another important distinction lay between team learning and the related concept of team develop. Models of team development rest on a number of assumptions:

1) Groups progress through relatively stable and predictable stages of behaviors punctuated by moments of rapid change. For example, Tuckman's (1965) ubiquitous model of psychological development includes five stages of forming, storming, norming, performing and adjourning,

2) Each of these stages is represented by a minimum number of modes of behavior. For example, forming and storming do not occur simultaneously, but occur one after another in a predictable sequence,

3) Each developmental stage is predominantly predetermined, impervious to the choices of the individual group member,

4) The goal of development is predetermined and moves toward continually higher stages of development (Siegler, 1996).

The dominant metaphor for the group development is climbing stairs, where each stair represents a new plateau to be reached and a new level of development achieved. Learning describes the processes that lead to and enable development to occur in the first place. The distinction between learning and development is often overlooked in research on groups and teams in organizations. The distinction is important because it points to the internal processes that make development possible. Unlike the clean, systematic developmental processes described in the literature, learning involves an iterative process of continual adaptation.

Team Learning: A Working Definition

A review of this diverse literature results on team learning resulted in an integrated and comprehensive normative model of team learning. This model emerges from a systems approach to team learning which consists with team research but rest on different assumptions about the nature of team inputs, processes and context. Performance is likely to lead to an improvement in a current process while learning may question the current process and if it is really addressing the "right" problem. This is likely to lead to a completely new alternative to a question that the firm was not aware needed a solution. This is similar to Argyris' (1991) single loop and double loop learning. Single loop learning is similar to the former in that it focuses on changes within the existing environment. Double loop is analogous to the latter since it revisits the

purpose/objective and seeks to determine potential alternatives. Team learning involves the generation of knowledge, while team performance focuses on specific, often narrowly drawn objectives of improving existing strategies for performing work. Thus, team learning theory rests on a different set of assumptions when compared to team performance models.

Individuals within a team learn by observing and interacting with each other and their environment. These interactions guide team member understanding of the changes in the environment around them. The outcome of which is a store of encounters and occurrences (knowledge) that shape and limit the repertoire of possible behaviors an individual and subsequently, the team, may undertake. Our thinking is theoretically consistent with Kolb's (1984) suggestion that learning is a process where knowledge is created through the transformation of experience. In a related idea, Weick, Suttcliffe, and Obstefeld (2005) argue that individuals undertake interdependent interactions with other actors and their environment to alter their actions and meanings. Additionally, they propose experiences are embedded in action or work practices and are not merely theoretical exercises. Learning occurs when individuals share their experiences thus, contributing their unique contextual knowledge to the team.

Components of Team Learning

Based on our review of the literature, we developed an integrated and comprehensive normative model of team learning based on five components of team learning. These components include three major components familiar to team work in general including inputs, processes, and outputs. Team processes consist of two distinct components that are *shared beliefs* and *shared behaviors*. The fifth component of team learning consists of the nature of the knowledge requirements of the team. Each of these components is discussed below.

Insert Figure 1 Components of Team Learning about here

Team-Level Inputs

Team level inputs consist of those factors related to individual team members that serve to contribute to team goals and purpose. Team inputs include those factors that can be understood by within team variance and that are focused on the social aspects of learning from experience. Team learning inputs consist of attributes related to the individual team members themselves. The attributes of team members can be considered along two dimensions. Dimension one is *permeability*, which describes the degree to which an attribute can be changed and is learned. For example, demographic attributes are low permeability but cognitive attributes are often highly permeable. Permeability is important because it points to the degree of influence the individual may have in changing that attribute. The second dimension is *degree of visibility*. For example, demographic attributes are highly visible while cognitive factors are low visibility (see Kayes & Kayes, 2006). Visibility is important because the less visible an attribute, the more it is thought be related to various experience and ability.

A number of different attributes have been suggested to lead to team learning. We suggest the concept of experience as an important input because it involves high permeability and low visibility. In contrast, demographic variables are highly visible but low in permeability. Thus, considering the two dimensions of diversity often talked about in team work, permeability and visibility experience is most related to learning and change.

Team-Level Outputs

Team level outputs result from a shared interdependence among team members (Sundstrom, DeMeuse, & Futrell, 1990). As mentioned earlier, team level outputs consist of various and complex sets of attributes consist with knowledge creation.

Team-Level Processes

The third component of team learning considers the shared beliefs, interaction and behaviors of the team itself. The basis for team level learning processes rests on two team level criteria. Team level processes include two distinct categories:

Shared Beliefs

Shared beliefs include the beliefs and attitudes shared among team members in regards to tasks and interpersonal interaction. The degree to which these beliefs are shared by members of the team suggest the very existence of a team beliefs.

Learning Behaviors

Team learning behaviors involve the behaviors related to the acquisition and processing of knowledge in teams. These include a variety of activities such as knowledge sharing, absorption, dissemination and dissemination.

Knowledge Requirements

Team learning also involves one additional factor: the knowledge required by the team to effectively accomplish its designated task. That team learning requires attention to knowledge requirements helps to distinguish team learning from other approaches to teamwork because it rests on the assumption that learning involves the gathering and processing of knowledge to accomplish team goals.

The specific knowledge requirements of a team have received little attention in the literature. This is perhaps because the team learning literature has relied heavily on theory related to team performance and effectiveness. The lack of attention to the nature of knowledge is unfortunate, as no theory of learning can be understood separate from a corresponding theory of knowledge.

We adopt a model of knowledge structure consistent with work on critical thinking and critical reflection which suggests that knowledge has a particular structure. It may be best to understand the structure of knowledge based on the particular type of knowledge required to complete a task or to solve a problem. Problems come in two types: *well-defined* and *ill-defined*. A well-defined problem has a clear goal, the means to achieve the goal are relatively clear and there is consensus on whether or not the problem was solved successfully. Examples of well-defined problems include building a bridge, increasing sales or producing goods. An ill-defined problem has no clear goal, the means to achieve the goal are not clear nor will there be consensus on whether a goal has been achieved (King and Kitchener, 1994). Imagine for example, trying to determine the most

effective leadership style, selecting the right employee for a professional job or creating a new product.

Each type of problem requires a different kind of knowledge to solve, and thus, demands different types of performance outcomes. An ill-defined problem might result in knowledge creation as an appropriate outcome measured in terms of creativity or innovation. On the other hand, a well defined problem might result in performance improvement over past performance measured in terms of output or time to output. Knowledge requirements of a problem provide an important component that has yet to be fully integrated into models of team learning. In the next section, we consider the impact of knowledge requirements on the function of learning within a team.

Mechanisms of Team Learning: Proximal Processes

This section provides an explanation for how these mechanisms work in a team based on the concept of *proximal team learning* borrowed from constructivist learning theory. Kayes (2003) introduced the term 'proximal' learning as a way to describe mechanisms by which team learning leads to improved performance in teams. Proximal learning occurs when one person is engaged with another person or persons to achieve problem solving capacity that could not be achieved by one individual alone. The concept of proximal learning draws on Russian Psychologist Lev Vygotsky's theory of social learning. Vygotsky's concept of the 'zone of proximal development' has proven extremely influential in understanding the process of language acquisition and problem solving in children. Vygotsky proposed that learning was a function of coordination between individuals with varying degrees of expertise, for example a parent and a child or a teacher and a student. Simply put, proximal learning describes the difference between the capacity of a person to solve a problem alone and the capacity of the person to solve the problem with a more experienced other. Simply stated, 'zone of proximal development' describes the potential of an individual to learn based on working with others.

The application of the concept of proximal learning to teams suggests that individuals working in a team can achieve greater performance outcomes when working together. The greater performance ability is achieved when individuals learn from one

another by sharing expertise, knowledge and insight during the problem solving process. Proximal processes emerge as differences exist on individual capacity, knowledge and experience among team members. The description of how individual capacity is transformed into team level learning through interaction as depicted in Figure 2 which describes team learning as a function of team problem solving capacity and problem complexity. As a team learns to deal with increasingly complex problems, proximal processes increase the team's ability to respond to these complexities.

Insert Figure 2: Proximal learning processes in teams about here

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The model suggests that learning and development share a reciprocal relationship Learning causes development—which in turn leads to a qualitatively different form of learning (Vygotsky, 1978). This higher level of functioning occurs when individual team members pool resources and work together toward a common purpose, goal or task. When individual activity is focused toward achieving team outcomes rather than just individual outcomes, individual experience is transformed into team learning. Proximal learning involves multiple types of knowledge processing behaviors:

1) Cognitive processes which include framing, reframing, and integrating perspectives,

2) Action processes which include boundary spanning and experimenting (Kasl, Marsick, & Dechant, 1997),

3) Reflection oriented practices such as problem posing, knowledge and idea generation, integrating new knowledge,

4) Practices such as active work, data gathering, and disseminating new information. (Brooks, 1994).

The specific behaviors and beliefs that enable proximal process are described in the next section.

A Learning Based Model of Team Performance in Organizations

Figure 3 depicts a comprehensive model of team learning. The model presents specific shared beliefs and learning behaviors believed related to team performance

outcomes. Each of these variables, as well as the specific performance outcomes associated with team learning are described below.

Insert Figure 3: Model of team learning and performance about here

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Learning Behaviors

Tacit Coordinating

Coordinating involves the seamless, often tacit or unconscious, organizing of diverse roles, coordination of knowledge and responsibility in a team. Coordinating describes the mechanisms or processes by which information moves between individuals. Coordinating describes a unique form of team learning in that it focuses on the synchronization of knowledge and skills within the team (Klein, 1998). Teams that develop tacit coordinating display an almost effortless ability to organize activity and to understand and to anticipate the work of other team members. Teams with tacit coordination interact with other members in a team as needed while displaying the ability to work independently to achieve a team goal. In other words, tacit coordination describes a kind of seamless synchronization between among team members (Weick & Roberts, 1993). The tacit coordinating perspective of team learning may be the least developed and thus, the most ripe for further development.

Tacit coordinating facilitates various teamwork processes such as decision making, exchanging information, and interpersonal awareness. Kayes (2003; 2004) proposed that coordinating is particularly important during short-term projects because teams often do not have the time to spend on extensive interpersonal or psychological development issues that are typically afforded to teams working together for longer periods of time (Tuckman, 1965). Therefore, we expect that tacit coordinating learning behaviors are especially important to enhanced team performance in short-term projects.

Adapting

Adapting involves responding to internal and external demands by adjusting actions and beliefs. Teams that display adaptive learning act decisively in the face of challenges or threats and respond to new situations as they arise. Where tacit cooperating tends to focus on how individuals work together and thus, improve the learning of both

the team and its individual members, adapting focuses on responding to changes and constraints that occur during the course of a team's lifecycle. Adapting is demonstrated when a team can evaluate their processes, change directions and develop a new course of action in response to perceived threats or inadequacies with their current problem solving strategy.

Adaptive learning has a rich tradition within the study of organizations and management. This adapting perspective suggests that teams need to adjust to environmental changes such as the implementation of new technology (Edmondson, Bohmer, & Pisano, 2001). Teams that are adapting may proactively identify mistakes and correct them before they occur. Adapting is an important part of learning in short-term project teams. The ability to adapt to changing demands in the external environment may allow a team to make sense of the world around them. Adaptation is particularly relevant in a multi-goal environment where changing strategies and redefining goals in mid-project are necessary (Perrow, 1984). Adapting means that teams can constantly reevaluate and change strategies mid-stream (Gersick, 1988).

Problem Solving

Problem solving involves focusing on problem related activities and working together rather than separately to address specific and defined problems. Collective problem solving focuses on the nature of the problem and the group's method of solving the problem. One approach to collective problem solving focuses on the team's cognitive complexity or the degree to which teams integrate and differentiate knowledge within a group (Grunfeld & Hollingshead, 1993). Collective problem solving also includes adapting to new demands, but remains more concerned with the attention on and activity of problem-solving itself. This perspective speaks of divergent team processes (e.g., expressed differences) and convergent processes (e.g., conformity) and their impact on learning. The collective problem solving approach is related to social cognition and how mental models (e.g., schemas, maps or pictures) limit or enhance learning (Druskat & Pescosolido, 2002).

One stream of research has shed light on the importance of problem structure to how teams learn and has concluded that when tasks are designed appropriately, teams are

better able to learn and improve satisfaction with team processes (Michaelsen, et al., 2004).

Shared Beliefs that Support Team Learning

Interpersonal Beliefs

      Trust. Trust describes the shared perception by team members about the nature of the group and its members regarding the psychological climate, emotional disposition of the group, and the degree of to which members of the group are will to share sensitive information especially as it relates to people's ability to feel safe to make or admit errors and mistakes, challenge authority, take challenging or controversial positions without fear of serious repercussions (Edmondson, 1999).

      Interpersonal Understanding. Interpersonal understanding describes the degree to which team members can recognize and comprehend the emotional states, preferences, skills or relationships of individuals in the group. Research has shown that understanding the unique situation or demands faced by other team members is related to fostering team learning (Druskat & Kayes, 2000). Interpersonal understanding is also linked to emotional intelligence in teams (Druskat & Wolfe, 2001).

Task Beliefs

      Team awareness. Team awareness describes the degree to which team members understand and utilize the expertise and knowledge of individual team members. Team awareness is the shared understanding among team members regarding the unique contribution made by each team member. This shared belief signals that teams understand the individual qualities of team members and can put them to the best use of the team. Team awareness marks an important belief that encourages sharing knowledge and engaging in behaviors associated with learning.

      Goal sharing. Goal sharing describes the degree to which the team members share perceptions that they have a clear and shared goal or common purpose. For example, each of the individuals on a team might share the same goal of solving a problem. The difference between an individual and team goal is that an individual goal can be

accomplished without the help of or involvement in a team. As Mills (1967) stated with a team goal, "the way to reach one's individual goal is through working with others in order to accomplish the group goal . . . accomplishing a group goal is a means toward individual goals" (p. 83). Team goal sharing, as apposed to common individual goals within the same team, becomes evident when team members demonstrate. Goal sharing should help a team focus its energies, talents and resources on engaging in learning behaviors that are appropriate for the task at hand rather than each team member putting in effort toward an individual effort that may not be related to team outcomes.

Efficacy. Team efficacy describes the degree to which a team shares confidence in its collective ability to accomplish a goal or achieve a positive outcome related to its purpose as a group. Learning theory suggests that efficacy, self confidence or a team's confidence in their own ability to perform a task, is related to actual task performance (Bandura, 1997). When applied to team settings, it describes collective efficacy as the shared perceptions and beliefs about a team's competence, ability to perform a task and meet performance challenges (Zaccaro, Blair, Peterson, & Zazanis, 1995) However, research findings on the value of efficacy to performance outcomes are mixed with respect to learning (Edmondson, 1999; Druskat & Kayes, 2000). Kayes (2004) recently suggested that when short-term project teams are overconfident, they may overlook some of the skills needed to perform a task successfully and may rely on their own confidence at the expense of learning. None the less, the notion that what teams expect to achieve may have some positive relationship to what they will achieve bares consideration because sharing such beliefs means that teams will actively seek to engage in behaviors that will lead to performance outcomes.

Team Performance Outcomes

Team composition, shared beliefs and behaviors provide the basis to enhance team performance outcomes. Team learning results in several potential outcome benefits for teams. The proposed model enlists a robust definition of outcomes that map along several dimensions. As Kolb (1984) contends learning results in the creation of knowledge and knowledge is a multi dimensional construct. Kolb outlines four dimensions of learning. Affective knowledge arises from knowledge related to

interpersonal skills, emotions and intuition. Reflective knowledge arises from knowledge related to observation, perception and attention to situation. Conceptual knowledge arises from theories, ideas and abstract concepts. Behavioral knowledge arises actions, skills and active engagement with the world. Taken together, these four types of knowledge result in a comprehensive model of knowledge creation. Kayes and Kayes (2006) applied this framework of knowledge to conceive of four outcomes for team learning.

Affective Outcomes

Affective knowledge creation can be measured in outcomes such as team satisfaction, increased ability to be an effective team member and an appreciation of the contribution of others. Measures such as team satisfaction (e.g. Hackman, 1987) and personal development fall into affective knowledge category. Affective knowledge creation is likely the primary performance outcome in teams that have the purpose of self development of its members or for other clients of the team. Examples in organizations might include social work teams or coaching teams.

Perceptual Outcomes

Perceptual knowledge creation can be measured in outcomes such as an improved ability to solve problems, think critically or manage more complex problems. Perceptual outcomes occur in teams that have the primary purpose of gathering and interpreting information, solving problems, or generating new ideas. Examples in organizations might include teams involved in the intelligence community, fact finding missions, or task forces designed with defining and recommending solutions to problems but not necessarily with implementing a solution.

Conceptual Outcomes

Conceptual knowledge outcomes demonstrate themselves in improved ability to perform certain tasks related to measurable outcomes such as improved performance on simple tasks, increased output and convincing arguments and ideas. Conceptual outcomes are the likely output of research and development teams, production teams involved in creative projects such as films or entertainment, scientific discovery or report writing.

Behavioral Outcomes

Behavioral outcomes demonstrate themselves in the ability of a team to improve on tasks that are easily measured and compared against the performance of other teams, for example, team involved in sales or assembly line production are most likely to demonstrate behavioral team outcomes.

Taken together, these four outcomes provide a comprehensive set of potential outcomes of team learning.

Implications

This section explores the implications of our model for developing and studying teams in organizations. We explore the practical implications of the model for assessing and improving team learning and ultimately performance in organizational teams. This includes special attention to issues of measurement. While we explain the benefits of developing a functionalist model of teams we also address some of the theoretical and practical limitations such a model may pose for research and practice.

The proposed model departs from much of the existing research on team learning by integrating previously diverse traditions of learning based on individual learning (Kolb, 1984), interpersonal and sensemaking (Weick 1979), and social (Vygotsky, 1978) learning. This synthesis helps to clarify the mechanisms that constitute team learning as a process that is distinct from, although related to various organizational concepts such as individual learning, group development and team performance. This model, while still under development, provides the basis to further explore the empirical and theoretical components and processes of team learning in organizations.

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Table 1

Definitions of Team Learning

Author(s)	Team Learning
Kasl, Marsick, & Dechant (1997)	A process through which a group creates knowledge for its members, for itself as a system, and for others. p. 229
Edmonson (2003)	A tightly coupled, recurring steps of enrollment of carefully selected team members by the leader, followed by pre-trial team preparation, and then by multiple iterations of trial and reflection. p. 49
Gibson & Vermueulen (2003)	Behaviors, including the exploration of knowledge through experimentation, the combination of insights through reflective communication, and the explication and specification of what has been learned through codification p. 203-04
Edmondson (1999)	An ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions. p. 353
Tjosvold, Yu, & Hui (2004)	Recognizing that unexpected, undesired effects have occurred and reflecting on these experiences to reduce the probability of their future occurrence. p. 1224
Ellis et al. (2003)	A relatively permanent change in the team's collective level of knowledge and skill produced by the shared experience of the team members. p. 822
Van der Vegt & Bunderson (2005)	Activities by which team members seek to acquire, share, refine, or combine task-relevant knowledge through interaction with one another. p. 534

Edmondson (2002)	An iterative action –reflection process that serves either an incremental or radical learning goal for the organization. p. 130
Sole & Edmondson (2002)	Acquisition and application of knowledge that enables a team to address team tasks and issues for which solutions were not previously obvious. p. 18
Robey, Khoo & Powers (2000)	Situated in practice, rather than formulated and delivered outside of the context of practice which occurs as members adjust to each other's needs. p. 54
Brown & Duguid (1991)	Communities being formed or joined and personal identities being changed where learning is going on in the process of and inseparable from work. p. 48
Sole & Edmondson (2002b)	Seeking information, experimentation, reflection, and salvaging insight from apparent failures. p. 592

Figure 1

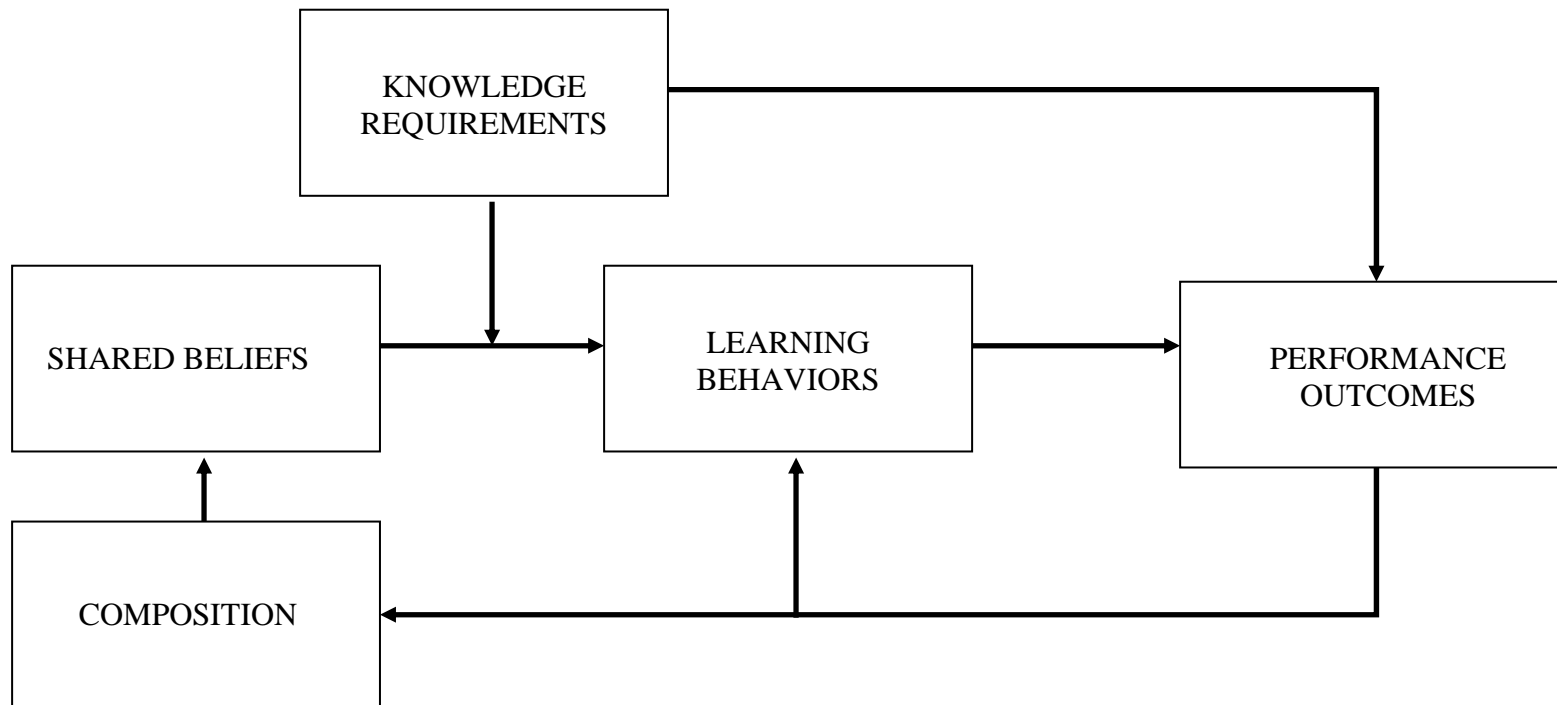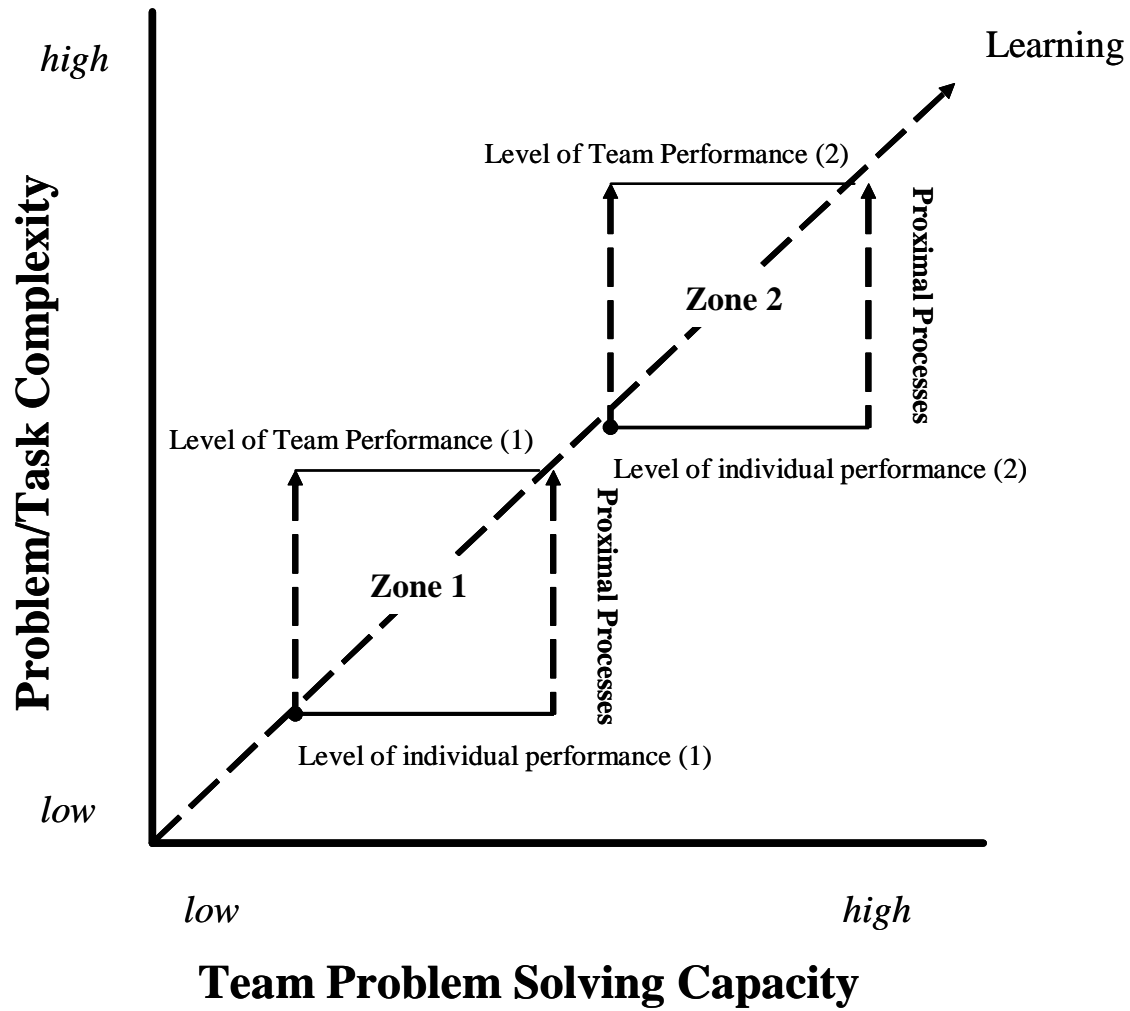Components of Team Learning and Performance

Figure 2

Proximal Learning Process in Teams

Figure 3

Comprehensive Model of Team Learning