LEARNING BEHAVIOR WITHIN TEAMS: AN INFORMATION PROCESSING MODEL

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ABSTRACT

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We know a great deal about individual learning and team learning but very little about individual learning within teams. While team learning theory acknowledges the role of individual learning, empirical attention directed at the effects of team context on the learning behavior of individuals is rather sparse. This is unfortunate, as a number of complexities are likely to influence the extent to which individuals engage in learning behavior. Moreover, different forms of learning behavior are argued to exist at the individual level which has important implications for the effectiveness of team members. In an effort to better understand learning behavior within teams, this study suggests that two main forms of learning-oriented behavior can be enacted by team members: active learning and active teaching. Social information processing is proposed as a mechanism by which team context influences both forms of learning behavior, which, in turn, influence subsequent outcomes such as task performance, social status, job satisfaction, and turnover intentions. Further, to develop a more refined theoretical analysis of this social information processing mechanism, the study draws from motivated information processing theory to suggest key moderating influences by which team context influences individual learning behavior. A quasi-experimental field study is conducted using a diverse sample of teams throughout several organizations. Overall, this study extends our understanding of learning behavior within teams with the ultimate aim of guiding future research and practice in this important area of research.

DEDICATION

This work is dedicated to my grandparents, Richard and Lulu Belle Sleesman, whose love and encouragement have inspired me and shaped my life. My grandpa would have turned 77 years of age on the day this dissertation was successfully defended.

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INTRODUCTION

We know a great deal about individual learning. Research has examined the learning behavior of individuals from a variety of perspectives including active learning and self-regulation processes (Bell & Kozlowski, 2008), feedback (Kluger & DeNisi, 1996), the effects of practice on expertise (Ericsson, Krampe, & Tesch-Römer, 1993), and the role of stress and emotions (LePine, LePine, & Jackson, 2004). We also know a lot about team learning. Learning at the team level of analysis has been associated with a number of antecedents including supportive leadership (Brooks, 1994), participation in decision-making (Sarin & McDermott, 2003), shared purpose (Ely & Thomas, 2001), cooperative goals (Tjosvold, Yu, & Hui, 2004), team structure (Ellis et al., 2003), as well as the presence of subgroups and demographic faultlines (Gibson & Vermeulen, 2003; Lau & Murnighan, 2005). Outcomes of team-level learning include improved efficiencies (Adler, 1990) and higher overall performance (Edmondson, 1999; Lewis, 2004).

Unfortunately, we know very little about the learning behavior of individuals within teams despite these relatively large bodies of literature and the fact that team learning theory explicitly acknowledges the role of individual learning (Argote, Gruenfeld, & Naquin, 2001; Edmondson, 1999). Most researchers interested in the intersection between learning processes and teams simply treat individuals as a data point whereby their perceptions of team learning are aggregated into a team-level construct. For instance, in her widely-influential study, Edmondson (1999) measured team learning behavior by aggregating individual perceptions, reporting an intraclass correlation coefficient of .33 ($p < .0001$) for this variable. Such an agreement level may be sufficient to justify aggregation to the group level (e.g., Kenny & La Voie, 1985), although it also means that a substantial amount of variance (approximately 66%) is unaccounted

for by the agreement of team members. It is possible that studies employing this popular measure (or similar ones, e.g., Van der Vegt & Bunderson, 2005) may actually be conflating both individual-level and team-level learning behavior, as reflected in some of the scale items – e.g., "This team actively reviews its own progress and performance" and "This team regularly takes time to figure out ways to improve its work performance". As discussed below, it is difficult for researchers to discern the extent to which such activities are attributed to the team or individual members within the team (see Klein, Conn, Smith, & Sorra, 2001 for an in-depth discussion of the issues involved with within-group agreement of work environment perceptions). Although such a methodological approach assumes homogeneity of these activities across team members, it is likely that they vary from person to person and yet this possibility is hardly ever recognized in the literature.

The lack of emphasis on individuals in the team learning literature is consistent with group and team research in general. As recently stated by Jehn, Rispens, and Thatcher (2010), "Much of group research focuses on shared team properties, or experience and perceptions team members hold in common (Klein & Kozlowski, 2000; Mason, 2006), often ignoring the existence of variance within teams." (p. 596). Researchers have even gone beyond the recognition of variance to explore the configural patterns of individual characteristics within a team (Kozlowski & Klein, 2000). For instance, DeRue, Hollenbeck, Ilgen, and Feltz (2010) recently explored the different ways in which efficacy can be dispersed within a team. Unfortunately, the team learning literature is unable to account for such variation within teams as its level of analysis has tended to be solely at the team level. A fundamental assertion in the current study is that team learning researchers should not overlook the role of individuals in teams because, in essence, it is really the people that "make the team" (cf. Schneider, 1987).

According to team learning theory, the process of learning at the group level "involves the activities through which *individuals* acquire, share, and combine knowledge through experience with one another." (Argote, et al., 2001, p. 370, emphasis added). These individual-level activities become enacted at the group level through group interaction. This is the dominant conceptualization of the process of team learning in the literature (e.g., Edmondson, 1999; Van der Vegt & Bunderson, 2005). However, in order to understand the nature of learning behavior *within* teams (that is, the learning behavior of individual team members), theoretical and empirical attention must be given to each of these individual-level activities. In particular, I suggest that team members can engage in two fundamental forms of learning-oriented behavior: active learning (cf. acquiring knowledge; Argote, et al., 2001) and active teaching (cf. sharing knowledge; Argote, et al., 2001)[1]. A combination of these two forms of learning-oriented behavior is argued to capture the process of combining knowledge (cf. Argote, et al., 2001). This view is consistent with Goodman and Dabbish (2011) who stated that "[k]nowledge sharing refers to a process by which some people contribute information and others utilize that information…" (p. 386). In sum, through the process of acquiring, sharing, and combining

[1] These terms were elicited from the training (e.g., Bell & Kozlowski, 2008) and educational psychology (e.g., Mayer, 2004) literatures. Active learning refers to a learner-centered approach to training or education that considers the learners as active participants in their learning experiences. It "involves using trial-and-error processes, taking risks, and deviating from standard routines, as well as trying out new work processes, asking questions, seeking feedback, and reflecting on potential results" (Katz-Navon, Naveh, & Stern, 2009, pp. 1200-1201), and thus Edmondson's (1999) concept of team learning behaviors is consistent with active learning. Active teaching describes efforts on the part of the instructor to encourage the discovery of learning using varying degrees of guidance and structure. Applied to a team context, active teaching refers to the efforts of individuals to help their teammates learn, or what may be described as "other-oriented" learning. Throughout this dissertation, I refer to both active learning and active teaching as learning behaviors because both are fundamentally about learning, although differing primarily by whether learning is directed at oneself or others.

knowledge, team members are able to work together to "collectively connect the dots" (Ellis, et al., 2003) and achieve team learning and performance.

The current study shows how the learning behavior of team members, depending on the particular form enacted (active learning and active teaching), impacts their effectiveness in beneficial and even harmful ways. This is in contrast to the positive bias in the literature which generally represents learning behavior as an unequivocally constructive activity. In this study, active learning is hypothesized to facilitate one's task performance whereas active teaching is expected to constrain the same variable. By contrast, active teaching is predicted to increase one's social status whereas active learning is expected to have an attenuating effect on this outcome. However, both active learning and active teaching are expected to increase one's job satisfaction and decrease turnover intentions. Further, a synergistic effect is also expected whereby high levels of both active learning and teaching will increase one's job satisfaction and decrease turnover intentions. Importantly, however, these propositions also suggest that individual task performance is expected to be highest to the extent that team members engage in high levels of active learning and low levels of active teaching. Thus, while active teaching may benefit the task performance of others in the team as well as the team as a whole, it is expected to be detrimental to one's own performance. Finally, one's social status is predicted to be highest to the extent that the individual engages in high levels of active teaching and low levels of active learning. In essence, the trade-offs between active learning and active teaching may create a sort of dynamic learning equilibrium or homeostasis within the team, and thus the theory developed in this study offers a parsimonious explanation for how teams are able to cooperatively learn.

The current study is not only concerned with the outcomes of learning behavior within teams but also antecedents related to team context because the team itself is argued to be a rich

contextual backdrop within which individual learning behavior takes place. To this end, the literature on team learning is integrated with social information processing (SIP) theory (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990) and motivated information processing (MIP) theory (De Dreu, Nijstad, & van Knippenberg, 2008; De Dreu, Weingart, & Kwon, 2000; Kunda, 1990) to offer an information processing-based multi-level model of learning behavior within teams. In particular, the learning behavior of team members is argued to be accentuated by the processing of social informational cues related to team context (in terms of both team psychological safety and team reflection). Finally, to develop a more refined theoretical analysis of this social information processing mechanism, two moderators derived from motivated information processing theory (epistemic and prosocial motivation) are argued to further strengthen the correspondence between these team contextual elements and individual learning behavior. The proposed conceptual model is presented in Figure 1. A quasi-experimental field study is conducted using a diverse sample of teams throughout several organizations to offer empirical support for the model.

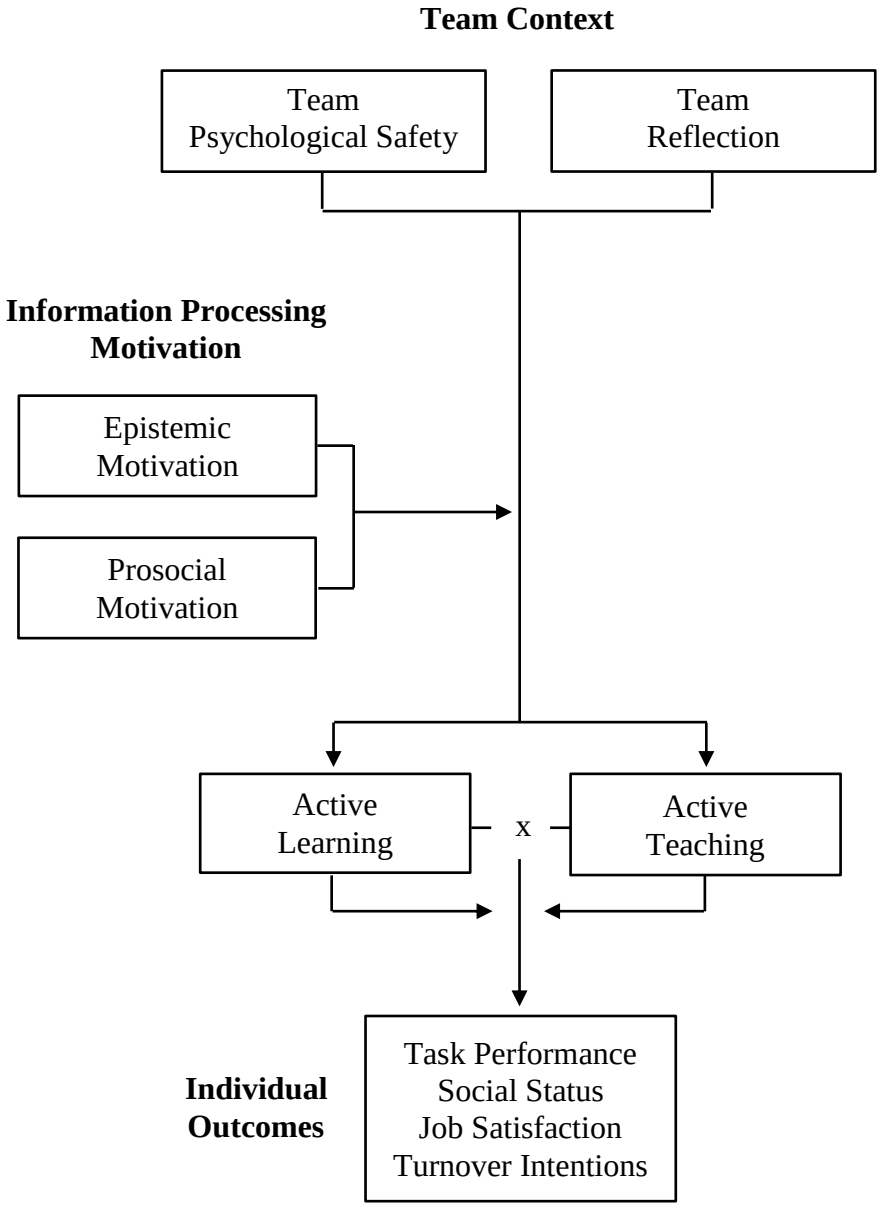

Figure 1. Conceptual Model

THEORY AND HYPOTHESES DEVELOPMENT

Learning across Organizational Levels

Organizational scholars have been intrigued by learning for a number of decades (e.g., Argyris & Schön, 1978; Levitt & March, 1988; March & Simon, 1958). The topic has become rather complex over the years; and as such, a number of perspectives of learning have emerged in the literature. For instance, the study of learning at the organizational level tends to emphasize the role of routines (e.g., rules, procedures, and conventions), which are independent of individuals and can thus be transmitted over time despite the turnover of organizational members (Levitt & March, 1988). By contrast, learning theories at the individual level of analysis tend to emphasize human cognitive limitations which can preclude the effectiveness of organizational change. For instance, learning in organizations tends to consist of simply detecting and correcting error rather than analyzing the underlying causes of it (such as troublesome administrative policies or social norms), which Argyris and Schön (1978) referred to as "single loop" and "double loop" learning, respectively.

Despite the emergence of such disparate learning theories at the individual and organizational levels of analysis, it can be argued that learning, in a general sense, "is viewed as an iterative process of action and reflection, in which action is taken, assessed by the actor, and modified to produce desired outcomes" (Edmondson, 2002, p. 128). As evident in this general process, learning is a fundamental, perhaps even essential, behavior in organizations. It has been linked to a number of important outcomes such as the reduction of accident and incident rates (Haunschild & Sullivan, 2002), the capacity to adapt to the task environment (Carmeli & Sheaffer, 2008) and innovate (Cannon & Edmondson, 2005), and it can increase the likelihood of organizational survival (Baum & Ingram, 1998).

Theory and research regarding learning at both the organizational and individual levels of analysis has been fruitful over the years; however, organizations frequently structure work around teams (Devine, Clayton, Philips, Dunford, & Melner, 1999; Osterman, 1994). As such, a substantial amount of research on team-level learning as also emerged. Edmondson, Dillon, and Roloff (2007) recently reviewed this literature and categorized this research into three discrete categories: outcome improvement, task mastery, and group process. The first category lies largely in disciplines such as operations management, competitive strategy, and economics. Of primary concern is the "learning curve", the notion that efficiency can be improved with experience. As an example, Darr, Argote, and Epple (1995) studied 36 pizza stores for over a year and a half, finding that unit costs decreased with production experience (learning). Knowledge transferred effectively from store to store, but only when the stores were owned by the same franchisee. Pisano, Bohmer, and Edmondson (2001) collected data from cardiac surgery departments to find that teams showed a substantial amount of variation in the successful adoption of a new cardiac surgery technology, with cumulative experience being a significant predictor of learning.

In contrast to outcome improvement, other team learning researchers have concentrated on task mastery, which involves the study of how team members coordinate their knowledge and skills to accomplish tasks. Importantly, this tradition views learning as an outcome often indicated by task performance. Learning is typically thought to result from effective cognitive systems, such as shared mental models (Cannon-Bowers, Salas, & Converse, 1993), transactive memory systems (Wegner, 1987), and social cognition (Larson & Christensen, 1993). For instance, Mathieu, Heffner, Goodwin, Salas, and Cannon-Bowers (2000) studied the emergence of shared mental models among teams of undergraduate students as they engaged in a flight

simulation. Results indicated the presence of two distinct types of shared mental models, one related to the team task and another related to teamwork. Both were found to facilitate team processes and performance. As another illustration of work in this area, Stasser, Stewart, and Wittenbaum (1995) found that explicit recognition of expertise within teams (i.e., having frank discussions regarding "who knows what") facilitates team task performance. The authors suggested that this represents informal schemas of accountability which informs team members regarding who to approach when particular knowledge is required.

Finally, team learning researchers have studied learning from a group process perspective, in which learning is conceived as a process rather than an outcome in the traditional input-process-output (IPO) framework in team effectiveness research (Hackman, 1987; McGrath, 1984). Unlike the perspective that views team learning as task mastery, most studies in this area have been conducted in field settings. As a classic example, Edmondson (1999) examined the learning behavior (a term which connotes learning as a *process*) of teams in a manufacturing firm. Her results suggested that context support and team leader coaching facilitated psychological safety (the perception that one can safely engage in interpersonal risk-taking within the team), which further predicted team learning behavior and performance. As another example, Van der Vegt and Bunderson (2005) studied a number of multidisciplinary teams in the oil and gas industry to examine the role of collective team identification, expertise diversity, team learning, and performance. Their results indicated that expertise diversity had a negative relationship with both learning and performance when team identification was low; however, expertise diversity facilitated learning and performance when team identification was high. The current study is positioned within this latter tradition of team learning research by emphasizing learning as a process rather than an outcome.

As the above review highlights, organizational scholars have studied learning at the organizational, individual, and team levels of analysis. In an important conceptual development, Edmondson (2002) advanced a "meso" approach to organizational learning, building on the observation from Senge (1990) that "teams are the fundamental learning unit in an organization" (Edmondson, 2002, p. 129). Her qualitative study suggested that organizational learning has three important characteristics which highlight the interface between the team and organizational levels, namely that organizational learning is local, interpersonal, and variegated. First, learning is local because it varies from team-to-team depending on their tasks to be completed. For example, some teams engage in problem-solving and learning that is ill-defined (e.g., research and development) whereas others involve problem-solving and learning that is more tightly structured (e.g., inventory management) (see Shapiro & Spence, 1997). Hence, learning is adapted to the local context in which the team functions. Learning is also interpersonal, as illustrated earlier in the Edmondson (1999) study which suggested that a climate characterized by psychological safety allows team members to feel comfortable to engage in team learning behavior. Lastly, organizational learning is variegated, as learning and learning goals tend to be heterogeneous throughout various teams in the organization. For example, some teams focus on incremental learning whereas others engage in learning that is more radical in nature (Miner & Mezias, 1996; see also the analagous distinction between "exploitation" and "exploration" learning, as described in March, 1991).

Edmondson's (2002) study was insightful for the organizational literature on learning because it abandoned the extant "silo" approach to learning in which researchers generally focused on either the organizational, individual, or team level. By contrast, she showed how researchers can cut across these different knowledge bases to offer an integrated approach to

learning. This is consistent with the relatively recent trend in management toward multi-level theory and analysis as well as (perhaps even proverbial) calls for more "meso" research that bridges micro and macro perspectives (House, Rousseau, & Thomas-Hunt, 1995; Klein & Kozlowski, 2000; Mathieu & Chen, 2011).

Learning-Oriented Behavior within Teams

Much like Edmondson (2002) cut across organizational levels in her exploration of the interface between team and organizational learning, the current study emphasizes the interplay between teams and individual learning. However, by slightly transposing the proposition of Senge (1990) highlighted above, this study suggests that individuals (rather than teams) are the fundamental learning unit in a team (rather than organization). Note that this proposition is remarkably consistent with team learning *theory*. For instance, the dominant conceptualization of team learning as a process was provided by Argote et al. (2001) who stated that "group learning involves the activities through which *individuals* acquire, share, and combine knowledge through experience with one another" (p. 370; emphasis added). Unfortunately, the proposition is remarkably inconsistent with team learning *research*, as most studies in the literature seem to focus entirely at the team level and assume homogeneity of learning among team members. Thus, a number of questions remain to be addressed. For instance, do the members within a given team acquire knowledge to the same degree? Do they share knowledge to the same degree? Further, how does team context affect the engagement of these learning-oriented behaviors? The extant literature cannot adequately answer these questions. Thus, while my earlier proposition that individuals are the fundamental learning unit in a team may seem self-evident on the surface and even be consistent with team learning theory, researchers in practice

do not seem to take this notion very seriously. By contrast, the current study expressly investigates the variation of learning behavior of individuals within teams.

As mentioned above, the process of learning at the group level of analysis involves the acquisition, sharing, and combining of knowledge among group members. Such activities include "asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions" (Edmondson, 1999, p. 353). The mere culmination of these individual-level activities does not capture learning at the group level, but rather the interaction among team members regarding these activities enacts group learning behavior. This general conceptualization is reflected in Edmondson's (1999) measure of team learning behaviors, by far the most dominant measure employed in the literature. Some example items are "This team actively reviews its own progress and performance" and "This team regularly takes time to figure out ways to improve its work performance". Such anthropomorphized language seems to imply that the team itself (as an entity) is capable of activities such as reviewing performance or figuring out ways to improve. Of course, a collective of individuals cannot do this, but rather its constituents can[2]. This observation may seem trivial prima facie, but consider the participant responding to such items who may be forming a response based upon any number of cues such as (1) the likelihood of a prototypical team member engaging in the given behavior, (2) the average of all team members engaging in the given behavior, (3) the extent to which the participant him- or herself engages in the given behavior, or (4) some weighted combination of these possibilities. Thus, the extant literature recognizes team learning behavior and its various

[2] The same analysis can be applied to a number of topics within the organizational sciences such as the study of risk-taking "at the firm level" or "organizational" cognition. My objective in this critique is not to discount such perspectives but rather to highlight assumptions and the considerations that must be made as topics are explored in different contexts or levels of analysis.

properties (e.g., acquiring and sharing knowledge, Argote, et al., 2001; asking questions and seeking feedback, Edmondson, 1999); however, it typically does not specify *who* in the team is actually enacting such behavior.

As this discussion illustrates, the team learning literature has generally been ambiguous with regard to differentiating team learning from learning within the context of teams (see Goodman & Dabbish, 2011; Wilson, Goodman, & Cronin, 2007). Wilson et al. (2007) offered an insightful framework for conceptualizing group learning which suggests that learning at the group level involves three processes: sharing, storage, and retrieval. These authors stated that "individuals can learn within the context of a group, and their learning may improve the group's performance, but it still is individual learning unless shared by members of the group. If an individual leaves the group and the group cannot access his or her learning, the group has failed to learn." (1042-1043).

Kozlowski and Klein (2000) distinguished between three distinct forms of team-level constructs. First, global properties represent properties of the team as a whole and do not originate in or emerge from individual members of the team. Examples include team size, function, and location. As learning necessarily originates with individuals (e.g., Argote, et al., 2001), it cannot be a global property. Second, shared team properties represent properties, such as attitudes and perceptions, which are held in common by team members. Examples include team norms or social climate. The third category of team-level constructs is configural team properties, which are similar to shared properties; however, they are concerned with the pattern, array, or variability of individual characteristics among team members (see DeRue, et al., 2010). The Wilson et al. (2007) framework of group learning is consistent with the shared team property

view of team-level constructs. This general conceptualization will serve as a useful guide for future work on team-level learning.

With regard to the learning behavior of individual team members, they are likely to vary in the extent to which they acquire, share, and combine knowledge (cf. Argote, et al., 2001) within the team. Thus, some team members may be especially prone to engaging in active learning (e.g., actively reviewing one's own performance) while others may tend to engage in active teaching (e.g., actively reviewing the performance of teammates). According to this view, individuals within teams may readily engage in learning on their own behalf; however, they may also choose to help others in the team learn. For instance, suppose a team of software developers are starting a new project which requires the use of a new development platform. Some team members may be able to quickly learn the new platform whereas others may take more time perhaps due to conflicting responsibilities with other projects or teams (O'Leary, Mortensen, & Woolley, 2011), or a variety of other factors including cognitive ability, self-efficacy or goal orientation (Salas & Cannon-Bowers, 2001). Regardless of the source of the disparity, in order for the team to effectively and efficiently transition to the new platform, some team members may engage in active learning while others enact active teaching by helping their teammates learn.

Before discussing each of these proposed forms of learning behavior in detail, it should be noted that somewhat similar, yet distinct, concepts exist in the literature. For instance, Ashford (e.g., Ashford, Blatt, & VandeWalle, 2003; Ashford & Tsui, 1991) has conducted extensive research on the notion of feedback-seeking behaviors which refer to proactive acts of acquiring feedback regarding one's work activities. While feedback-seeking is a component of learning behavior (which may include seeking feedback on behalf of oneself or others), it is only

one component along with others such as experimenting with work methods and reflecting on results. Another similar concept is information seeking (e.g., Morrison, 1993), which refers to efforts to acquire information which may be with respect to a number of targets such as one's work, supervisor, or organization. This differs from learning behavior because while learning behavior may involve information seeking (e.g., asking a coworker about a particular work method), it also involves activities which arguably do not involve any information gathering from others. For instance, a given employee may silently reflect upon his/her performance over the past week, which most would argue does not constitute information-seeking behavior.

I view both active learning and active teaching as forms of proactive behavior. In their review of this literature, Grant and Ashford (2008) discussed the many manifestations of proactive behavior in the literature including feedback seeking (Ashford, et al., 2003), expressing voice (LePine & Van Dyne, 1998), taking initiative in pursuit of goals (Frese & Fay, 2001), adapting to new environments (Wanberg & Kammeyer-Mueller, 2000), taking charge (Morrison & Phelps, 1999), rule-breaking (Morrison, 2006), and many others. Grant and Ashford (2008) defined proactive behavior as "anticipatory action that employees take to impact themselves and/or their environments" (p. 8), which is consistent with the notions of active learning and active teaching proposed in the current study. Moreover, active teaching is particularly representative of helping behavior, which refers to efforts to provide assistance and aid to others (Van Dyne & LePine, 1998). For example, an item from the Van Dyne and LePine (1998) helping behavior scale includes "This particular co-worker helps others in this group learn about the work". However, active teaching is a particular, more specific form of helping behavior – helping that is focused on learning. Consistent with this, most items in the Van Dyne and LePine

(1998) scale include more general forms of helping such as “helps orient new employees in this group” and “attends functions that help this work group”.

Active Learning. Active learning is defined as proactive efforts to acquire knowledge from others. It essentially represents learning on one’s own behalf. Learning-related activities such as asking questions when faced with an uncertain task or experimenting to improve work methods can allow individuals to be more effective as they work. There is ample evidence that active learning relates to a number of important outcomes such as task performance, social status, job satisfaction, and turnover intentions.

First, there are a number of reasons why active learning is expected to increase task performance. Recall that learning behavior is “characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions” (Edmondson, 1999, p. 353). Below I discuss these aspects of learning behavior and how each is likely to facilitate task performance. For instance, there is evidence that asking questions and seeking feedback are likely to facilitate task performance, as these activities can equip team members to more effectively perform their job. For instance, Morrison (1993) conducted a longitudinal study of newcomers and their information-seeking patterns. Some types of information, such as information related to technical issues, role demands, and performance feedback, was learned from supervisors; while other types of information, such as normative or social information, was learned from peers. In general, results suggested that the frequency of information seeking was related to performance.

Feedback serves as a source of motivation and gives employees insight into the correction or improvement of their performance strategies (Kluger & DeNisi, 1996; Vroom, 1964). For instance, studies have found that goal setting has an especially pronounced effect on

performance when facilitated by feedback (e.g., Erez, 1977). Thus, receiving feedback about one's performance provides information about any adjustments that need to be made in the course of performing work. Moreover, feedback-seeking, especially negative feedback-seeking, has been found to predict performance (Ashford & Tsui, 1991).

Research has shown that getting group members to think critically, a notion consistent with the "asking questions and seeking feedback" component of learning behavior, encourages them to consider unshared information during group discussions (Postmes, Spears, & Cihangir, 2001). This is important in group contexts, as discussions within teams tend to focus on information held in common by group members rather than pooling the unique information distributed throughout the group (Stasser & Titus, 1985). Thus, critical thinking enables individuals to access more knowledge from other team members which in turn is likely to improve their decision-making and performance.

In addition, the experimenting aspect of learning behavior is also expected to improve task performance. Experimenting is typically thought to be a precursor to innovation (Henderson & Clark, 1990), which is helpful in facilitating performance in order to cope with competitive pressures and environmental uncertainty (Kanter, 1988; Katz & Kahn, 1978). Employees who are unwilling or unable to innovate are likely to become stagnant over time and less able to effectively adapt to their environment, which is especially crucial for individuals within teams (Burke, Stagl, Salas, Pierce, & Kendall, 2006).

The reflection on results aspect of learning behavior is also likely to improve the task performance of team members. Earlier I drew from prior literature which suggests that feedback can facilitate task performance. Some have extended this finding to suggest that feedback, when paired with reflection, is especially likely to result in task performance improvements (Anseel,

Lievens, & Schollaert, 2009; Hall, 2002). This is because reflection, and its associated cognitive elaboration of information about past behaviors, allows individuals to learn from their experiences in order to improve future performance (Anseel, et al., 2009; Daudelin, 1996; Ellis & Davidi, 2005; Hall, 2002; Hullfish & Smith, 1961). As an example, Gurtner, Tschan, Semmer, and Nägele (2007) employed a team-based military task to study the effectiveness of reflection on performance. Part of their study included asking individual team members to reflect upon their performance at approximately the mid-point of the task, finding that reflection led to performance improvements during the second half of the task. From this theory and research, the reflection on results aspect of learning behavior is expected to facilitate task performance.

Further, the discussion of errors or unexpected outcomes, also an aspect of learning behavior, is expected to facilitate performance. A growing literature recognizes that errors can actually be beneficial because they provide a source of information regarding why performance may have failed, and thus people can "learn through failure" (Sitkin, 1992). For instance, Ellis, Mendel, and Nir (2006) studied different types of after-event reviews and found that following successful events, reviews focused on *incorrect* actions were more effective than those focused on *correct* actions. Driven by the theory highlighted above regarding the facilitative effects of feedback on performance (e.g., Kluger & DeNisi, 1996), the training technique known as "error management training" actually encourages trainees to make mistakes in order to learn from them. A recent meta-analysis has confirmed that this technique can be quite effective for improving performance (Keith & Frese, 2008). More generally, the training literature has consistently found relationships between learning and performance (e.g., Mathieu, Tannenbaum, & Salas, 1992). In sum, the above discussion suggests that active learning is likely to have positive effects on individual task performance.

Hypothesis 1: Active learning will be related to an increase in one's task performance.

Social status refers to one's degree of interpersonal influence and standing within a social context (Bourdieu, 1984). Status hierarchies in groups are "dynamically evolving social constructions, manipulable through efforts of the parties involved rather than as emergent, static social structures." (Bendersky & Hays, 2012, p. 337). From this perspective, I argue below that the engagement of active learning will lead to a decrease in one's social status within the team.

This prediction is driven by theory related to power (Emerson, 1962; French & Raven, 1959). Emerson (1962) suggested that power is characterized by a set of dependence relationships. Thus, power is defined in terms of how dependent a given individual is on others. Reflecting this perspective, the literature on helping behavior suggests that when people receive help, it implies that they are unable to do the given task alone and thus are dependent on others (DePaulo & Fisher, 1980; Lee, 1997, 2002). Lee (1997) even stated that help-seeking is related to "powerlessness". Similarly, the literature on feedback-seeking (e.g., Ashford & Cummings, 1983) and information-seeking more generally (e.g., Morrison, 1993) suggests that individuals tend to avoid seeking information via inquiry due to concerns of losing face or "looking bad" in the eyes of others. By extension, active learning can be considered a form of help-seeking or feedback/information-seeking because individuals engaging in such behavior learn by activities such as asking teammates for feedback or acquiring information and ideas from others. Thus, the engagement of active learning is likely to decrease one's power, and hence social status.

Hypothesis 2: Active learning will be related to a decrease in one's social status.

Finally, active learning is expected to result in increased levels of job satisfaction and decreased turnover intentions. Many people are intrinsically motivated to engage in activities

that demonstrate competence and promote growth (Deci & Ryan, 2000). Thus, learning behavior may be a naturally emerging activity which reinforces one's enjoyment in work. The well-supported Job Characteristics Model (Hackman & Oldham, 1976, 1980) posits that feedback, one of the core dimensions of a given job, provides an opportunity for employees to understand the results of their work activities. Consequently, the presence of feedback is believed to enhance satisfaction and reduce the likelihood of turnover. Because seeking feedback about one's own performance is an aspect of active learning, the engagement of this behavior is expected to be positively related to job satisfaction and negatively related to turnover intentions. Similarly, the organizational newcomer study by Morrison (1993) found that information-seeking activities were predictive of not only performance, as mentioned above, but also satisfaction and intentions to leave.

In addition, experimenting and reflecting on one's performance imply that one feels able to make an impact on his or her work. Thus, these activities are likely associated with feelings of empowerment, which has been found to predict job satisfaction (Spreitzer, Kizilos, & Nason, 1997). Similarly, experimenting and reflecting are also likely associated with work-related internal locus of control, the perception that work outcomes are under the control of the individual, which a recent meta-analysis has found to be positively related to job satisfaction and negatively related to turnover intentions (Wang, Bowling, & Eschleman, 2010).

As previously discussed, the engagement of active learning is likely to result in an increase of one's knowledge, skills, and/or abilities (KSAs) in the process. Employees who consistently increase their KSAs (by means such as active learning) will tend to be noticed by others within the team (e.g., a supervisor), which in turn is likely to elicit positive feedback, ultimately resulting in subsequent job satisfaction and a reduced likelihood of turnover (cf.

Lankau & Scandura, 2002). Overall, I expect that active learning will be positively related to job satisfaction and negatively related to turnover intentions. Thus,

Hypothesis 3: Active learning will be related to an increase in one's job satisfaction.

Hypothesis 4: Active learning will be related to a decrease in one's turnover intentions.

Active Teaching. Active teaching is defined as proactive efforts to share knowledge with others. In essence, active teaching represents activities that help teammates learn, and thus it is directed at others rather than oneself. For instance, an individual may ask a teammate questions about his/her (the teammate's) task when faced with uncertainty (e.g., "Now that your biggest client has cancelled their account, have you thought about how you're going to get more leads?"). As another example, an individual may encourage a teammate to experiment in order to improve his/her (the teammate's) work methods (e.g., "You may want to try out this new software because I think it will really help you communicate with customers more effectively."). Below I discuss theory and research which suggest that active teaching relates to a decrease in one's task performance and an increase in social status, in contrast with active learning. In addition, it is also expected to increase job satisfaction and decrease turnover intentions.

First, I argue that active teaching will decrease one's own task performance. Recall that earlier I discussed how active teaching is considered a specific form of helping behavior. Thus, I draw from the literature on helping behavior and the more general organizational citizenship behavior (OCB) literature in support of this hypothesis. In their review of the OCB literature, Spitzmuller, Van Dyne, and Ilies (2008) noted that "there is little research on the consequences of performing OCB for those who perform OCB" (p. 115). Indeed, in terms of the consequences

of OCB, the vast majority of the literature has focused on the consequences of citizenship behavior for the organization or individual(s) on the recipient end of the behavior. Interestingly, researchers in this area are increasingly recognizing both the benefits *and costs* of the decision to engage in citizenship behavior.

Bergeron (2007) recently stated that "little research has explored the relationship between task performance and OCB" (p. 1078). In response to this, she used a resource allocation framework (Becker, 1965; Hockey, 1997) to theorize on how the engagement of citizenship behavior relates to one's own task performance. This perspective asserts that time is a fixed resource, and therefore individuals must make daily decisions as to where to spend their time. By implication, because these resource allocation decisions are a fixed-sum activity, any time spent on a given task results in less time available to engage in others. The application of this perspective to the context of citizenship behaviors and task performance is relatively straightforward: The more time individuals spend on citizenship behaviors, the less time they have to spend on task performance. By extension, I suggest that the more team members engage in active teaching, the less time they have to spend on their own taskwork and hence task performance will suffer. Support for this assertion was provided by Barnes, Hollenbeck, Wagner, DeRue, Nahrgang, and Schwind (2008) in their study of backing-up behavior in decision-making teams. These authors found that team members engaged in such behavior tended to neglect their own taskwork, especially when the workload was evenly distributed. This is somewhat analogous to the findings of Bunderson and Sutcliffe (2003) who found that "too much emphasis on learning can compromise efficiency…" (p. 558) among teams. Thus, consistent with this research and the logic outlined by Bergeron (2007), I anticipate a negative relationship between active teaching and task performance.

It should be noted that some researchers have reported a positive relationship between OCBs and managerial ratings of job performance (Podsakoff, Whiting, Podsakoff, & Blume, 2009). In support of this finding, Shore, Barksdale, and Shore (1995) argued that managers weigh OCBs relatively heavily in their judgments of performance because the engagement of OCBs is more volitional than pure task performance. Thus, OCBs are perceived as especially indicative of one's commitment to the success of his or her workgroup or organization. Another argument in support of this finding is that the engagement of OCBs elicits managers' liking of employees which positively biases their performance assessments (Lefkowitz, 2000). While it may seem that these arguments are inconsistent with my hypothesis of a negative relationship between active teaching and task performance, careful attention should be given to the criterion of interest, namely performance. While OCBs may be positively related to managerial assessments of job performance in a general sense, the current study is concerned specifically with task performance, the extent to which individuals successfully complete their formally assigned tasks. This distinction has been foundational to years of research on citizenship behavior (for recent reviews, see Podsakoff, et al., 2009; Spitzmuller, et al., 2008). For instance, the influential study of Williams and Anderson (1991) theoretically and empirically distinguished between "in-role" (task performance) and "extra-role" (citizenship) behaviors. While the overwhelming majority of studies on OCB have concentrated on the positive aspects and benefits of OCBs (as reflected by the valence of each hypothesis in the recent meta-analysis of Podsakoff, et al., 2009), the current study joins the minority by examining the "downside" of engaging in citizenship behavior (active teaching, in this case).

Hypothesis 5: Active teaching will be related to a decrease in one's task performance.

Support for the expectation that active teaching will result in an increase in one's social status comes from the literatures on power (Emerson, 1962; French & Raven, 1959) and social exchange theory (Blau, 1964; Gouldner, 1960; Homans, 1958; see Cropanzano & Mitchell, 2005 for a review). First, because power is characterized by a set of dependence relationships (Emerson, 1962), it can be defined in terms of how dependent others are on a given individual. Researchers in the helping behavior tradition have found support for the assertion that when people receive help from others, it implies that they are unable to do the given task alone and are thus dependent on the individual providing the help (DePaulo & Fisher, 1980; Lee, 1997, 2002). This general perspective suggests that as the receiver of help decreases in power, the provider of help necessarily increases in power. By implication, the engagement of active teaching is expected to increase one's power, and hence one's social status. Moreover, helping others learn implies expertise and competence (two key methods of gaining power, cf. French & Raven, 1959; Salancik & Pfeffer, 1977b). Because status in group settings is generally based on perceptions of expertise and competence (Bunderson, 2003; Ridgeway, 1984), active teaching is thus predicted to increase one's social status within the team.

Turning now to a social exchange perspective, this literature suggests that the dynamic exchange of resources is predicated on the expectation that resources given will result in an equitable amount of resources received (Blau, 1964; Gouldner, 1960; Homans, 1958). For example, a group of employees agreeing to work overtime may explicitly or implicitly assume that their act of volunteerism will be reciprocated by management in the future, or perhaps the group is motivated by the desire for respect from peers. In any case, people have a natural desire to associate acts of helping with the receipt of social rewards (Adler & Kwon, 2002; Gouldner, 1960). The literature on helping behavior has found that individuals providing help to others tend

to receive positive evaluations from them (e.g., perceptions of generosity) and consequently, higher levels of social status (Flynn, 2003; Flynn, Reagans, Amanatullah, & Ames, 2006). In sum, drawing from the above literature on power and social exchange, I anticipate that active teaching will result in a higher degree of social status.

Hypothesis 6: Active teaching will be related to an increase in one's social status.

Finally, active teaching is also predicted to result in an increase in job satisfaction and a decrease in turnover intentions. Some of the reasons for these two predictions are similar to that of active learning. For instance, because many people are intrinsically motivated to engage in activities that demonstrate competence and promote growth (Deci & Ryan, 2000), helping others learn may represent a growth activity and as such is likely to be a naturally emerging behavior which reinforces one's enjoyment at work. Similarly, experimenting and reflecting on the work of others, or encouraging them to do so, is likely associated with feelings of empowerment. After all, why would someone encourage such behavior if he or she did not believe an impact could be made on others? As mentioned above, empowerment has been linked to job satisfaction in previous research (e.g., Spreitzer, et al., 1997). In a similar vein, experimenting with and reflecting on the work of others, or encouraging them to do so, is also likely associated with work-related internal locus of control which, as previously mentioned, is positively related to job satisfaction and negatively related to turnover intentions (Wang, et al., 2010). Additionally, active teaching is likely to foster positive feedback (e.g., gratitude) from teammates or perhaps a supervisor, which is likely to result in subsequent job satisfaction and a reduced likelihood of turnover, consistent with the logic of Lankau and Scandura (2002).

These two predictions are also driven by reasons other than those mentioned above for active learning. For instance, Bateman and Organ (1983) found that citizenship behavior was

related to one's job satisfaction, which has consistently been found to be a negative predictor of turnover in the literature (Griffeth, Hom, & Gaertner, 2000). OCBs have been argued to be an indication of one's commitment to, or withdrawal from, the organization, given their discretionary nature (Chen, Hui, & Sego, 1998). Consistent with this, the meta-analysis of Podsakoff et al. (2009) found a negative relationship between OCB and turnover as well as turnover intentions.

Research in social and personality psychology regarding prosocial behavior may also offer some valuable insights into the effects of active teaching on job satisfaction and turnover intentions. Studies within this literature (see Penner, Dovidio, Piliavin, & Schroeder, 2005 for a review) have found that the provision of prosocial behavior can alleviate negative mood states (Cialdini & Kenrick, 1976) which is likely to have positive implications for the enjoyment of one's job. Moreover, engaging in prosocial activities (such as volunteering) predicts well-being outcomes such as life satisfaction, happiness, self-esteem, physical health, sense of control over life, and depression (e.g., Thoits & Hewitt, 2001; Yogev & Ronen, 1982). These findings regarding the effects of prosocial behavior on well-being suggest that active teaching is likely to facilitate job satisfaction, as well-being has been found to associate with job satisfaction in a recent meta-analysis (Bowling, Eschleman, & Wang, 2010). In sum, active teaching is expected to be positively related to job satisfaction and negatively related to turnover intentions.

Hypothesis 7: Active teaching will be related to an increase in one's job satisfaction.

Hypothesis 8: Active teaching will be related to a decrease in one's turnover intentions.

To summarize these predictions, I have suggested that active learning and active teaching will each have direct effects on individual effectiveness outcomes. In particular, active learning is expected to be positively related to one's task performance, whereas active teaching is anticipated to have a negative relationship with this outcome. By contrast, active teaching is predicted to be positively related to one's social status, while active learning is expected to have an attenuating effect. However, both active learning and active teaching are expected to have positive relationships with one's job satisfaction as well as negative relationships with turnover intentions.

Following from these direct effects, I also expect interactive effects on each of the outcomes as well. In particular, I anticipate both neutralization and accentuation effects. First, by combining my predictions regarding task performance, I anticipate that this outcome will be highest to the extent that individuals engage in high levels of active learning combined with low levels of active teaching. Thus, I expect active teaching to neutralize the positive effects of active learning on one's task performance. By combining my predictions regarding social status, I expect this outcome to be highest to the extent that individuals engage in high levels of active teaching combined with low levels of active learning. This suggests that active learning will neutralize the positive effects of active teaching on one's social status.

With regard to job satisfaction and turnover intentions, both active learning and active teaching are expected to reinforce each other and thus high levels of each are anticipated to result in especially pronounced effects on each of these outcomes. Hence, accentuation effects are expected for active learning and teaching on both job satisfaction and turnover intentions. My formal predictions regarding these interaction effects are as follows:

Hypothesis 9: Active learning and active teaching will have an interactive effect on the change in one's task performance such that the positive relationship between active learning and the change in task performance will be neutralized when active teaching is also high.

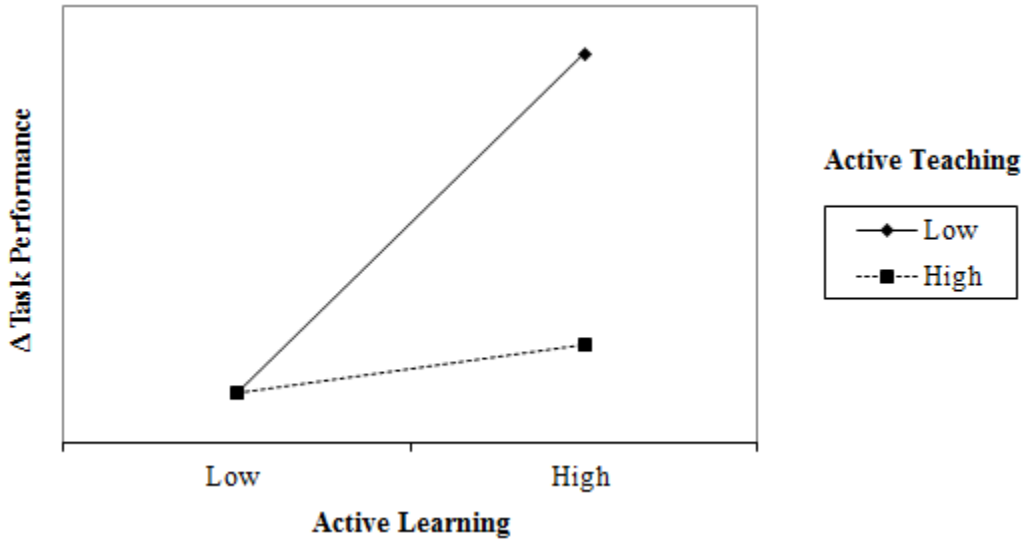

Figure 2. Anticipated Interaction Plot for Hypothesis 9

Hypothesis 10: Active learning and active teaching will have an interactive effect on the change in one's social status such that the positive relationship between active teaching and the change in social status will be neutralized when active learning is also high.

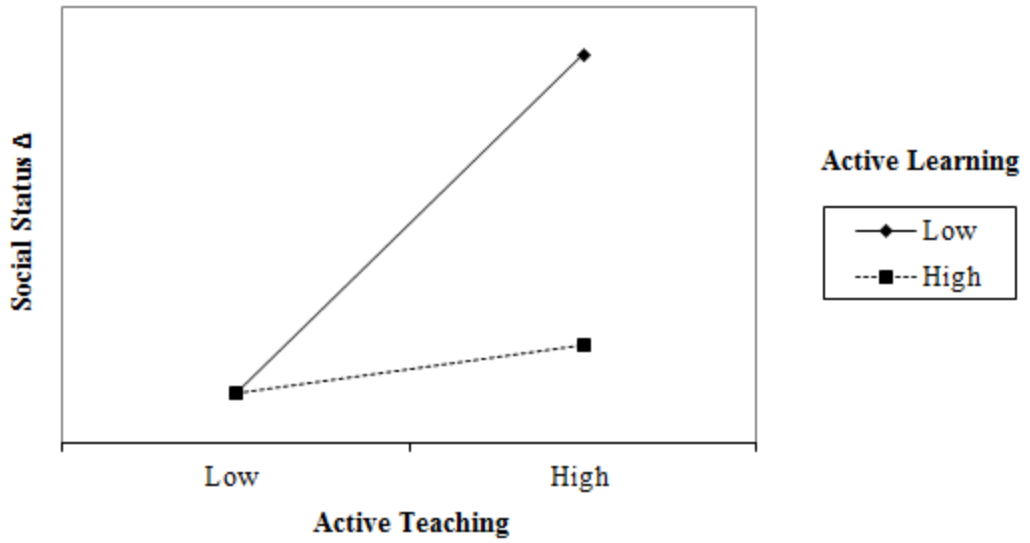

Figure 3. Anticipated Interaction Plot for Hypothesis 10

Hypothesis 11: Active learning and active teaching will have an interactive effect on the change in one's job satisfaction such that the positive relationship between active learning and the change in job satisfaction will be accentuated when active teaching is also high.

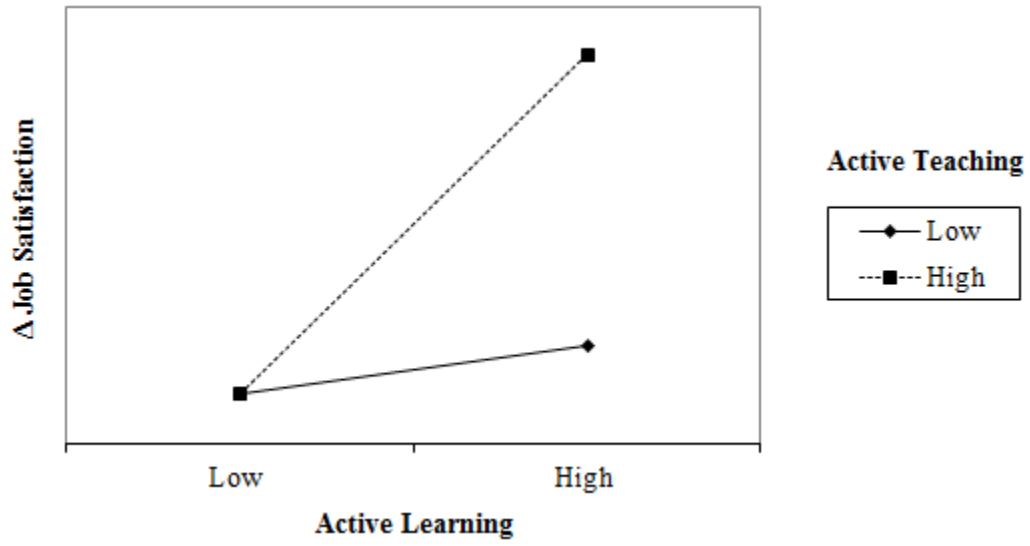

Figure 4. Anticipated Interaction Plot for Hypothesis 11

Hypothesis 12: Active learning and active teaching will have an interactive effect on the change in one's turnover intentions such that the negative relationship between active learning and the change in turnover intentions will be accentuated when active teaching is also high.

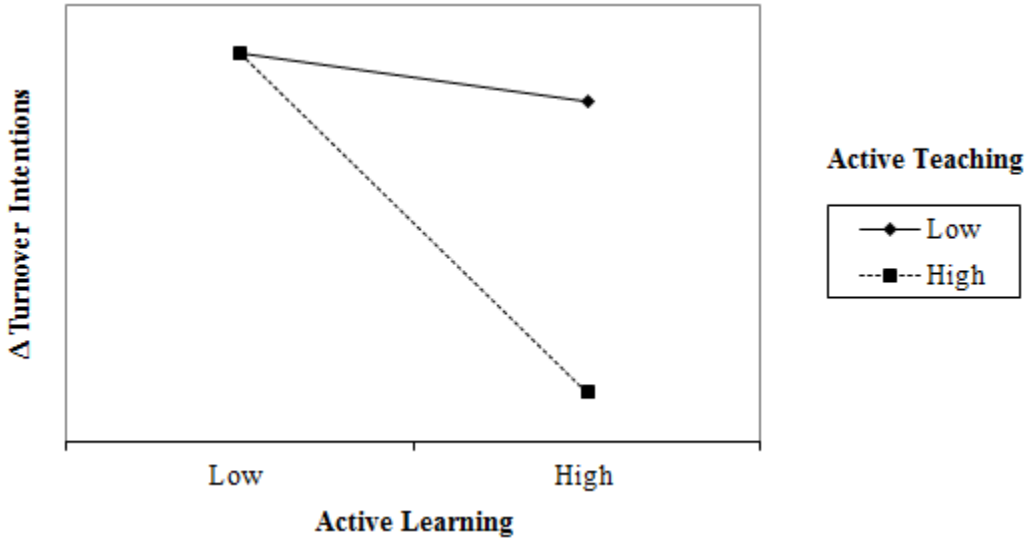

Figure 5. Anticipated Interaction Plot for Hypothesis 12

Characterizing Team Context for Active Learning and Active Teaching

So far, I have discussed how learning-oriented behavior within teams (active learning and active teaching) is expected to affect important outcomes such task performance, social status, job satisfaction, and turnover intentions. Attention is now turned to the antecedents of learning-oriented behavior within teams. In particular, the current study examines how active learning and active teaching are impacted by team context. While there are numerous team contextual elements that might affect the behavior of team members, two are proposed to have an especially pronounced impact on individual learning behavior due to their inherent features, as elucidated at length below: team psychological safety (an emergent state; Edmondson, 1999) and team reflection (a generalized team transition process; Marks, Mathieu, & Zaccaro, 2001; West, 1996,

2000). These team-level influences are theorized to impact the learning behavior of individuals via social information processing (SIP; Salancik & Pfeffer, 1978; Zalesny & Ford, 1990).

Social Information Processing

Social information processing theory "proceeds from the fundamental premise that individuals, as adaptive organisms, adapt attitudes, behavior, and beliefs to their social context and to the reality of their own past and present behavior and situation" (Salancik & Pfeffer, 1978, p. 226). The theory proposes that one's perceptions, attitudes, and behavior are a function of his or her social environment, as it provides informational cues which help to construct and interpret events. Thus, "one can learn most about individual behavior by studying the informational and social environment within which that behavior occurs and to which it adapts" (Salancik & Pfeffer, 1978, p. 226). An implication of the theory is that individuals cannot truly make sense of events in isolation from their social context, consistent with Weick's (1995) notion of sensemaking.

As an example of how social information can influence attitudes, suppose an individual is giving an important presentation to a committee, such as an entrepreneur conducting a venture capital "pitch". Throughout the presentation, the judgment of this individual regarding his or her effectiveness will likely be driven by informational cues derived from the immediate social environment. Examples include the degree to which intriguing questions are asked, the type of comments that are made by the committee, and even facial expressions or gestures from bystanders. This individual would simply be unable to generate an accurate assessment of his or her effectiveness without such social information.

Informational cues derived from one's social environment provide not only a means of constructing or interpreting events, but they also provide a source for norms and behavioral

expectations. For instance, the literature on organizational socialization suggests that information gathering can reduce uncertainty for newcomers and allow them "to understand, predict, and control their environments" (Morrison, 1993, p. 558). Social information guides organizational members about what behavior is considered appropriate or desirable in their particular social setting (team, department, division, etc.).

Social information processing theory has had an impressive influence on the field of management since its inception by Salancik and Pfeffer (1977a, 1978). They originally proposed the theory as a contrasting viewpoint to existing approaches to job attitudes such as those based on expectancy theory and need-satisfaction (e.g., Porter, 1961; Vroom, 1964). Salancik and Pfeffer argued that such approaches "do not seriously consider the possibility that job characteristics are socially constructed realities, mediated by the individual's social environment, rather than inherent characteristics of the objective situation." (Salancik & Pfeffer, 1977a, p. 431). Thus, social information processing theory suggests that attitudes are not given (e.g., by having an innate need), but rather they are cognitive byproducts stemming from information processing about the attitude object (such as a job or organization) and one's past behaviors in a given social context.

Classic empirical tests of social information processing theory involved manipulating the perceived attitudes or beliefs of *others*, which were generally found to influence one's own attitude (e.g., satisfaction) toward a given task (e.g., O'Reilly & Caldwell, 1979; Weiss & Shaw, 1979). A SIP perspective has been used to enrich a wide range of areas within the management literature since these early studies. For instance, Katz (1982) argued that the longer groups are together, the more social influence processes contribute to group homogeneity. As stated by Katz, "as project members work together over a long period, they will reinforce their common

views, commitments, and solution strategies" (p. 101). Such homogeneity was found in his study to isolate groups from important sources of information and impair their performance.

There are many other areas in the management literature that have been influenced by SIP as well. For instance, social information processing has been fundamental to the work of Ashford on feedback-seeking (e.g., Ashford & Cummings, 1983). An assumption of research in this area is that "feedback is an informational resource for individuals" (p. 382), which can be provided by others with whom a given employee interacts. Thus, social information in the form of feedback can influence one's perceptions and attitudes. Social information processing has also been posited as the fundamental theoretical mechanism that differentiates structural and psychological empowerment (Wallace, Johnson, Mathe, & Paul, 2011, p. 840). While structural empowerment refers to formal delegation of responsibility and authority, psychological empowerment represents the perception of empowerment as indicated by one's social context (e.g., coworker behavior or attitudes). Sitkin and Pablo (1992) suggested that social information can affect risk behavior via the influence of organizational culture. As stated by the authors, "for employees in which extreme risk seeking or risk aversion are clearly favored, situational risk will be perceived automatically and unthinkingly, as the culture has, in effect, pre-processed situational information" (p. 22). As another example of the influence if SIP, Woodman, Sawyer, and Griffin (1993) argued that social informational cues can facilitate creative processes in organizations via the exchange of perspectives and influences among employees. Thus, "groups provide an arena in which members can use others as resources to augment their own knowledge" (p. 303).

Social information processing theory is utilized in the current study to provide a theoretical mechanism which bridges team contextual information to the learning behavior of

team members. I now discuss team context and how two particular contextual elements, team psychological safety and team reflection, are argued to influence learning behavior within teams.

Team Context

There are a number of team contextual elements that might affect the behavior of team members; however, I suggest two that are expected to have an especially pronounced impact on individual learning behavior: team psychological safety (an emergent state; Edmondson, 1999) and team reflection (a generalized team transition process; Marks, et al., 2001; West, 1996, 2000). These particular constructs were included in the proposed model for two primary reasons. First, their conceptual properties make them especially amenable to the engagement of learning behavior. For example, the trust inherent in a psychologically safe climate is expected to alleviate concerns over the interpersonally risky nature of learning behavior such as asking others for help or discussing errors (Edmondson, 1999). Also, the awareness of personal experiences via reflection is likely to help individuals integrate new concepts into existing knowledge structures which is key to learning (Gray, 2007; Hullfish & Smith, 1961). The second reason why these two constructs were chosen is because the literature on team learning has found them both to be facilitators of learning behavior at the team level (e.g., De Dreu, 2007; Edmondson, 1999). As a result, because this study introduces learning behavior from a slightly different perspective (i.e., individual-level learning behavior), it seems fitting to examine these established relationships from a different, multi-level perspective via social information processes.

Team Psychological Safety. The decision to engage in any form of interpersonal behavior is associated with a certain degree of risk, although some behaviors are inherently riskier than others. Interpersonally risky behaviors may include engaging in task conflict,

whistle-blowing, challenging the strategy of one's team or leadership, and germane to the present context – the engagement of learning behaviors. Team psychological safety refers to the "shared belief that the team is safe for interpersonal risk taking" (Edmondson, 1999, p. 354), and thus the emergence of a psychologically safe team climate allows team members to engage in interpersonally risky behaviors without fear of sanctions or punishment from other group members.

Without a psychologically safe environment, employees may be "silenced by fear" (Kish-Gephart, Detert, Treviño, & Edmondson, 2009). For instance, research suggests that psychological safety facilitates voice (Walumbwa & Schaubroeck, 2009), whereas a lack of psychological safety tends to result in silence (Ashford, Rothbard, Piderit, & Dutton, 1998). Research has found that psychological safety is associated with a number of other important outcomes such as exploitative and exploratory learning (Kostopoulos & Bozionelos, 2011), learning from failures (Carmeli & Gittell, 2009), creativity (Kark & Carmeli, 2009), communication regarding unsafe acts and physical safety (Hofmann & Stetzer, 1996), and even the propensity to engage in unethical team behavior (Pearsall & Ellis, 2011). Psychological safety is a critical emergent state that develops over the life cycle of a team (Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Kozlowski & Bell, 2003). Thus, the lack of a psychologically safe climate may actually signal a problem in the formation and development of a team.

Psychological safety is similar, yet distinct, to other constructs such as trust and perceived organizational support. First, the concept of trust is focused on others (e.g., giving a peer the benefit of the doubt), whereas psychological safety is focused on the self and the way others respond to the self (e.g., the extent to which others give me the benefit of the doubt when I make a mistake; Edmondson, 2004). Moreover, trust is related to anticipated consequences that

may span into the distant future, whereas psychological safety generally pertains to interpersonal consequences that are relatively short-term (Edmondson, 2004). In addition to trust, psychological safety may sometimes be confused with perceived organizational support. However, the latter construct refers to the extent to which the organization cares about one's well-being and values his or her contributions (Rhoades & Eisenberger, 2002), whereas psychological safety is instead concerned with the perception of feeling comfortable to engage in interpersonal risk-taking.

From a social information processing perspective (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990), the emergence of a psychologically safe team climate is argued to be associated with social informational cues which confirm such a climate. Examples include verbal assurance from a supervisor that employees are encouraged to voice their opinions without judgment, or the observation of teammates openly criticizing team procedures. By the processing of such social informational cues, I argue below that team psychological safety will facilitate both active learning and active teaching among team members. Note that this is consistent with the finding in the literature with regard to psychological safety and learning behavior at the team level. However, as discussed earlier, the extant literature has assumed homogeneity of such behavior across team members. To date, studies have generally ignored how team climate affects the variation of learning behavior *within* teams and its resulting individual effectiveness outcomes.

Recall that learning behavior involves "asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions" (Edmondson, 1999, p. 353). These activities, whether oriented toward oneself (active learning) or utilized in order to help others learn (active teaching), are vulnerable for team members because each has the potential to expose them to interpersonal risk. As stated by Edmondson

(1999), “those in a position to initiate learning behavior may believe they are placing themselves at risk; for example, by admitting an error or asking for help, an individual may appear incompetent and thus suffer a blow to his or her image” (p. 351). Argyris and Schön (1978) argued that although criticism and negative evaluation are psychologically threatening activities, they are needed in order to trigger learning. A psychologically safe climate is expected to provide an environment whereby individuals can freely criticize and evaluate, and thus engage in learning-oriented behavior.

A psychologically safe team climate is critical for enabling learning behavior among team members. For instance, discussing errors or unexpected outcomes regarding one’s own work performance may imply incompetence. Similarly, discussing errors or unexpected outcomes *regarding the work performance of a peer* may imply incompetence on the part of the peer. As such, helping others learn (active teaching) may engender embarrassment or scorn toward the team member initiating such behavior. This suggests that neither active learning nor active teaching is likely to occur in the absence of a psychologically safe team climate.

Consistent with this argument, Hofmann, Lei, and Grant (2009) recently suggested that “trust is likely to encourage individuals to seek out help from experts by making it safe to be vulnerable” (p. 1263). Their study of help-seeking among 146 nurses in a large hospital found that the decision to ask for advice is influenced by perceptions of accessibility and trustworthiness. These results are consistent with the notion that a psychologically safe climate creates a learning environment whereby individuals can freely engage in learning behavior.

Information sharing is a critical process by which teams gather and utilize the knowledge distributed across members (Hinsz, Tindale, & Vollrath, 1997). A recent meta-analysis by Mesmer-Magnus and DeChurch (2009) has confirmed the importance of information sharing for

team effectiveness. Importantly, however, information can serve as a means of establishing and retaining power in social settings (e.g., Salancik & Pfeffer, 1977b), and therefore sharing information may be perceived as losing one's social power. A psychologically safe environment, and its concomitant trust of others within the team, is likely to attenuate the extent to which individuals perceive the need to clench power by withholding information. Stated differently, team members are likely to be inclined to share information if a psychologically safe climate has emerged. Consistent with this proposition, Gruenfeld, Mannix, Williams, and Neale (1996) studied the decision processes of groups engaged in a murder mystery (i.e., hidden profile; Stasser & Stewart, 1992) task. Some groups consisted entirely of strangers while others included members that were familiar with each other. Results indicated that the latter groups were better able to pool together information when it was initially unshared across group members. While the study did not explicitly examine psychological safety per se, the results are consistent with the notion that trust facilitates information sharing among team members, as trust is likely a factor in the results of this study, as noted by the authors in their discussion section. By extension of this theory and research on power, trust, and information sharing, I suggest that psychological safety encourages active teaching in particular, as information sharing is a key part of such behavior (e.g., providing feedback to teammates about their performance, keeping them up-to-date with information and ideas, etc.).

As mentioned earlier, both active learning and active teaching are considered to be forms of proactive behavior, defined as "anticipatory action that employees take to impact themselves and/or their environments" (Grant & Ashford, 2008, p. 8). The engagement of proactive behavior is believed to entail a degree of interpersonal risk (Morrison & Phelps, 1999; Parker, Williams, & Turner, 2006); and as such, proactive behaviors (learning behaviors, in the current study) are

likely facilitated by the emergence of a psychologically safe climate. Also, the engagement of active learning implies to a certain extent that the given individual needs some form of help (e.g., soliciting feedback from a peer regarding one's performance in order to learn or discussing performance errors with others in order to discover what caused the problem). Consistent with this perspective, Lee (1997, study 1) conducted an experiment which consisted of undergraduates calculating the net present value of employee severance packages, which was especially difficult without access to the appropriate formula or a calculator. All participants could easily ask their (confederate) partners for help, however less than a third actually did so. This result suggests that individuals have a natural tendency to avoid soliciting help from others, perhaps due to the interpersonally risky nature of help-seeking. This is consistent with my proposition that learning behavior, an interpersonally risky activity, will tend to not occur in the absence of a psychologically safe climate.

In sum, the above theory and research suggests that the emergence of a psychologically safe climate, and its associated social informational cues, will facilitate both active learning and active teaching. I now turn my attention to team reflection, another important element of team context expected to impact individual-level learning behavior.

Team Reflection. Reflection is defined as a cognitive process whereby one attempts to increase awareness of personal experiences by integrating and evaluating new concepts into existing knowledge structures (Gray, 2007; Hullfish & Smith, 1961). A basic assumption of reflection is that it operates through a critical examination of past experiences in order to generate an accurate understanding. Dewey (1933/1986) considered reflective thinking as "the better way of thinking", as it is "the kind of thinking that consists in turning a subject over in the mind and giving it serious and consecutive consideration." (p. 3). Scholars in the education

literature have maintained for years that reflection is a key part of learning (e.g., Dewey, 1933/1986; Hullfish & Smith, 1961). John Dewey, considered by many to be among the foremost scholars in the area of reflection, stated the following: "Of course intellectual learning includes the amassing and retention of information. But information is an undigested burden unless it is understood. It is *knowledge* only as its material is *comprehended*. And understanding, comprehension, means that the various parts of the information acquired are grasped in their relations to one another – a result that is attained only when acquisition is accompanied by constant reflection upon the meaning of what is studied (Dewey, 1933/1986, pp. 177, emphases preserved).

Reflection has been identified as a core element in the way teams accomplish work. For instance, in their seminal article on team processes, Marks, Mathieu, and Zaccaro (2001) proposed a "recurring phase" model of team functioning whereby teams sometimes "are focused on activities related directly to goal accomplishment [action phases], while at other times they are *reflecting* on past performance and planning for future action [transition phases]." (p. 360, emphasis added). The recurring transition between these two phases served as a foundation to their framework of team processes. Thus, according to this widely-influential perspective, team effectiveness is not only a function of the task-oriented activities of the team but also their ability to integrate this experience into a period of reflection which informs their planning for subsequent task-oriented activities. While the Marks et al. (2001) taxonomy specifies three different transition processes (mission analysis formulation and planning, goal specification, and strategy formulation), each of them are characterized as reflective to a certain extent. Thus, in the current study, I consider team reflection to be a "generalized" team transition process. This is consistent with recent work which suggests that the processes identified by Marks et al. can

actually be represented as higher-order constructs (e.g., LePine, Piccolo, Jackson, Mathieu, & Saul, 2008; Mathieu, Gilson, & Ruddy, 2006; Mathieu & Taylor, 2007).

Team reflection is not only considered important to the manner in which teams perform work, it is also considered a key enabler team learning. In fact, "team learning breaks down when teams fail to reflect on their own actions, or when teams reflect but fail to make changes following reflection" (Edmondson, 2002, p. 130). Moreover, Edmondson (2002) described team learning as "a process in which a team takes action, obtains and reflects upon feedback, and makes changes to adapt or improve" (p. 129). Similarly, Gibson and Vermeulen (2003) suggested that the process of "reflective communication" is a primary means by which teams are able to learn. In their review and conceptual clarification of the group learning literature, Wilson et al. (2007) also highlighted the role of reflection in group learning as shown in their proposition that "Group discussions about performance discrepancies that reflects past, present, and future scenarios increases the probability of group learning" (p. 1047).

Team reflection can also help with interpersonal processes and outcomes within teams. For instance, as conflict tends to be mitigated to the extent that teams have norms of collaborative communication (Lovelace, Shapiro, & Weingart, 2001) and openness (De Dreu & Weingart, 2003; West & Anderson, 1996), team reflection is likely to help alleviate relationship conflict within teams. Moreover, the process of reflection can help teams to realize how previous conflict episodes began and unfolded over time; and as a result, the likelihood of future conflict episodes can subsequently be reduced or handled more effectively in the future.

A growing literature centers on the notion of team reflexivity, a process defined as the extent to which teams metaphorically "bend back" (the root of "reflexivity", cf. West, 1996, p. 559) and "overtly reflect upon [their] objectives, strategies and processes, and adapt them to

current or anticipated endogenous or environmental circumstances" (West, 1996, p. 559). Team reflexivity has been found to predict important team outcomes such as innovation (De Dreu, 2002; Tjosvold, Tang, & West, 2004), learning (De Dreu, 2007), shared mental models and task representations (Gurtner, et al., 2007; van Ginkel, Tindale, & van Knippenberg, 2009), organizational citizenship behavior (Tjosvold, Hui, & Yu, 2003), and team performance (Carter & West, 1998; Hirst, Mann, Bain, Pirola-Merlo, & Richver, 2004; Schippers, Den Hartog, Koopman, & Wienk, 2003).

The notion of reflection has enhanced our understanding of various areas within the management literature not only with regard to team functioning (Carter & West, 1998) but also areas such as performance feedback (Anseel, et al., 2009) and leadership (Ollila, 2000). However, the literature does not provide an account of the multi-level nature of reflection or, in particular, how team reflection influences the learning behavior of team members. Answering a recent call for more research on how individuals are impacted by their team learning experiences (Edmondson, et al., 2007), the current model includes team reflection as an antecedent to learning behavior.

From a social information processing perspective (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990), highly reflective teams are argued to produce social informational cues which confirm such emphasis on reflection. Examples include the observation of team members reflecting on the team's prior activities or the endorsement of team reflection by a high-status peer. By the processing of such social informational cues, highly reflective teams will likely facilitate both active learning and active teaching among team members.

As discussed above, social informational cues have functional value for team members because they provide a source for norms and behavioral expectations. Recall that "reflecting on

results" is a key activity of learning behavior (Edmondson, 1999). Individuals in highly reflective teams are more likely to process (as compared to individuals in teams that tend to not reflect) informational cues which affirm an emphasis on team reflection. Thus, over time, members of reflective teams are likely to perceive that reflection is a norm or behavioral expectation within the team, and hence they will be likely to engage in individual-level learning behaviors (both active learning and active teaching). This is consistent with Bandura's (1977) social learning theory whereby behavioral models (in this case, the team) can have a remarkable influence on one's own behavior (in this case, individual-level learning behavior).

In addition, highly reflective teams are likely to have climates which foster and support learning activities. For instance, drawing from the goal orientation construct of VandeWalle (1997), some researchers have examined team learning orientation (e.g., Bunderson & Sutcliffe, 2003; Dragoni, 2005), the notion that teams vary in the extent to which they emphasize learning. Such a climate may foster positive attitudes toward learning among team members, which likely stimulates learning behavior.

In sum, individuals within highly reflective teams are argued to engage in more individual-level learning behaviors (active learning and active teaching) than individuals not in highly reflective teams. In the following section, I offer specific hypotheses regarding the manner in which team reflection (and also team psychological safety) impacts individual-level learning behavior. However, before proceeding, I will discuss the manner in which team reflection is investigated in this study.

To examine the effects of team reflection, I will conduct a training intervention in order to stimulate reflection at the team level. Doing so allows for a greater ability to infer causality, and as such, provides a better empirical test of the proposed model. Moreover, there is reason to

expect that most teams will *not* engage in high levels of reflection before the intervention and hence a correlational study would likely suffer from restriction of range for this variable. This expectation regarding low base rates of reflection is driven by a number of studies showing that teams engage in sub-optimal levels of reflection. Managers tend to emphasize action at the expense of reflection (Daudelin, 1996). Moreover, "reflection at the group level is a discussion process, and if teams are busy or accustomed to routine (Gersick & Hackman, 1990), such reflective discussion simply may not occur." (Edmondson, 2002, p. 130).

Fortunately, reflection can be trained. As stated by Dewey (1933/1986), "While we cannot learn or be taught to think, we do have to learn *how* to think well, especially *how* to acquire the general *habit* of reflecting" (p. 35, emphases preserved). Somewhat surprisingly, no published study has, to my knowledge, reported a team reflection training intervention on organizational teams, although mixed results have been reported in laboratory contexts (Gurtner, et al., 2007; Nederveen Pieterse, van Knippenberg, & van Ginkel, 2011; van Ginkel, et al., 2009; van Ginkel & van Knippenberg, 2009; see Moreland & McMinn, 2010 for a discussion regarding the effectiveness of team reflexivity). I believe the reason why mixed results have been reported is that many researchers provide little guidance to teams as to the content of reflection. For example, Gurtner et al. (2007) found that, contrary to their expectations, the team reflection intervention employed in their lab study resulted in no higher performance than the individual reflection intervention. Close examination of how the interventions were conducted in the study, however, reveals that little guidance was provided to participants as to what they should specifically be reflecting on. Consistent with this, post hoc analyses suggested that reflection in a group setting resulted in discussions of task strategies that were too general to be helpful (cf. Daudelin, 1996), which may explain why team-level reflection was no more effective than

individual-level reflection. From this finding, the authors considered this tendency of groups to focus on overly-general strategies to be a "disadvantage" of group reflection. As an alternative explanation, it may be the case that the group reflection intervention would have been more effective if it were more structured. The Method section below outlines a highly structured team reflection intervention.

Moderators of the Impact of Team Context on Active Learning and Active Teaching

So far, I have argued that learning behavior can exist in two fundamental forms at the individual level: active learning and active teaching. Further, I suggested that team context (in terms of both team psychological safety and team reflection) influences each of these forms of learning behavior. Social information processing was argued to be the mechanism by which team context exerts its influence. I now direct my attention to moderators of the impact of team context on individual-level learning behavior. In doing so, I offer a more refined theoretical analysis of this social information processing mechanism. In particular, I draw from motivated information processing theory to suggest that team context exerts differential influences on the learning behavior of team members, depending on differences in one's motivation to process social information. In the sections that follow, I introduce motivated information processing theory and argue that motivation moderates the impact of team context on individual-level learning behavior.

Motivated Information Processing

In their review and extension of social information processing theory, Zalesny and Ford (1990) reasoned from existing attitude and persuasion research (e.g., Petty & Cacioppo, 1986) that "the influence of social information on attitude development and change is a direct function of the depth of processing that occurs when social information is presented." (p. 227). Thus,

according to their view, social information processing has a more pronounced effect on attitudes and behaviors when processed systematically. Extending this general idea, the current study utilizes motivated information processing theory (De Dreu, et al., 2008; De Dreu, Weingart, et al., 2000; Kunda, 1990), which proposes that motivation influences cognitive processing such that individuals tend to perceive, encode, and retain information that is consistent with their desires. By integrating this perspective with social information processing theory (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990), I propose two distinct categories of information processing-based motivational influences (epistemic and prosocial) that will accentuate the extent to which team context influences the learning behavior of team members.

For years, researchers have studied the manner in which individuals process information. It has become a well-accepted proposition that people are biased in the manner in which they engage in information processing. Kunda (1990) discussed how people engage in motivated reasoning, presenting two broad categories by which reasoning is influenced: the motivation to "arrive at an accurate conclusion" and the motivation to "arrive at a particular, directional conclusion" (p. 480). For instance, theory on search and decision-making within organizations (Cyert & March, 1963; March & Simon, 1958) suggests that decision-makers search for alternatives until finding one that meets some aspiration level. When this aspiration level is particularly high, one can infer that the given individual has a motivation to reach some optimal outcome, such as forming an accurate conclusion in the case of reasoning (cf. Kunda, 1990). By contrast, a low aspiration level suggests that even a relatively non-optimal outcome is adequate (satisficing; March & Simon, 1958). Another instance of motivated information processing is the notion of confirmation bias (Nickerson, 1998) which describes the tendency for people to seek information that confirms their existing beliefs. Thus, people with a confirmation bias are *not*

motivated to arrive at an accurate conclusion but rather a particular conclusion, consistent with Kunda's (1990) framework. Moreover, Kruglanski and Freund (1983) suggested that biases such as stereotyping and anchoring effects are instances of "epistemic freezing" whereby people arrive at sub-optimal conclusions rather than engaging in effort to gain "epistemic awareness". Their results suggested that certain factors may increase or decrease the likelihood of epistemic freezing. For instance, time pressure was associated with an increase in epistemic freezing (i.e., low epistemic motivation), while the expectation that one's judgment will be evaluated is associated with a decrease in epistemic freezing (i.e., high epistemic motivation). This is consistent with the work of Tetlock (1992) regarding the effects of process accountability on decision-making quality.

While Kunda's (1990) perspective on motivated information processing focused on the differences between the desire to be correct and the desire to arrive at a particular (biased) conclusion, other researchers have examined motivated information processing from slightly different perspectives. For instance, De Dreu et al. (2000) drew from both Deutsch's (1949) theory of cooperation and competition as well as Pruitt and Rubin's (1986) dual concern theory to offer a meta-analysis of how prosocial motivation affects negotiation outcomes. Examples of negotiator prosocial motivation include concern about the feelings and well-being of the other party or the desire to seek an understanding of their perspective. Results suggested that when negotiators are prosocially motivated and are resistant to yielding, they tend to engage in more problem solving, were less contentious, and achieved higher joint outcomes.

As this review illustrates, information processing may be "motivated" in a number of ways. However, two forms of motivation are believed to be especially relevant in the context of

groups (De Dreu, et al., 2008): epistemic motivation and prosocial motivation. Attention is now turned to each of these motivational forms.

Epistemic Motivation. Epistemic motivation refers to "the willingness to expend effort to achieve a thorough, rich, and accurate understanding" of one's environment (De Dreu, et al., 2008, p. 23). Note that this is consistent with Kunda's (1990) notion of motivation to be accurate in one's reasoning. Epistemic motivation has been found to impact important decision-making processes and outcomes. For instance, individuals with low epistemic motivation are more likely to base their inferences on heuristics such as stereotypes and irrelevant anchoring information as compared to those with high epistemic motivation (De Dreu, Koole, & Oldersma, 1999). In addition, epistemically motivated individuals have been found to revise their preexisting cognitive structures in a negotiation context as a result of engaging in systematic information processing (De Dreu, Koole, & Steinel, 2000), which is discussed below.

I argue that epistemic motivation accentuates the extent to which individuals systematically (or "deeply", cf. Zalesny & Ford, 1990) process the social informational cues within their team. This is expected to ultimately translate into a greater correspondence between team context (team psychological safety and team reflection) and one's individual learning behavior, both active learning and active teaching. The literature on dual process perspectives of information processing suggests that individuals can process information in two different ways: They can engage in a systematic, deliberate, and careful analysis of information or they can employ a heuristic, automatic, and relatively effortless approach (Chaiken & Trope, 1999; Epstein & Pacini, 1999; see Evans, 2008 for a review). The former approach requires cognitive effort in order to evaluate and integrate relevant information into one's attitudes or judgments. Note the similarities between this perspective and epistemic motivation. Indeed, the tendency to

engage in either systematic or heuristic processing is contingent upon one's degree of epistemic motivation.

The dual process literature also suggests important implications of these two forms of information processing. For instance, systematic and deliberate information processing tends to result in attitudes that are generally more persistent, resistant to change, and predictive of behavior as compared to when information is processed heuristically or without much thought (Haddock, Maio, Arnold, & Huskinson, 2008; Petty, Haugtvedt, & Smith, 1995). Thus, depth of processing tends to positively impact attitude strength. Even the mere perception that high amounts of information elaboration have taken place actually predicts one's attitude certainty (the "thoughtfulness heuristic", cf. Barden & Petty, 2008). As originally proposed by Zalesny and Ford (1990), this literature can be extended to the domain of social information processing in that attitudes and behaviors based on such systematic and deliberate processing of *social* information will be more meaningful for individuals as compared to when they engage in heuristic or shallow social information processing.

By applying this logic to the current study, I suggest that team members within psychologically safe or reflective teams will be especially likely to engage in learning behaviors to the extent that they are epistemically motivated. This is because epistemic motivation is associated with systematic and deliberate information processing which, as discussed above, results in attitudes that are especially persistent, resistant to change, and predictive of behavior.

Zalesny and Ford (1990) stated that that "[t]he importance for the SIP model of level of processing differences lies in the products of the processing. Although the same reported perceptions or attitudes may result from either level of processing, their effects on behavior and subsequent information processing are likely to be quite different." (p. 228). Thus, even though

each individual within a given team is exposed to the same team contextual elements (e.g., team psychological safety and team reflection), the extent to which these elements affect their engagement of learning behavior is, in part, determined by their proclivity to engage in systematic or "deep" processing. These predictions are provided more formally as follows:

Hypothesis 13a (Team Psychological Safety/Active Learning): Epistemic motivation will accentuate the positive relationship between team psychological safety and the change in one's active learning.

Hypothesis 13b (Team Psychological Safety/Active Teaching): Epistemic motivation will accentuate the positive relationship between team psychological safety and the change in one's active teaching.

Hypothesis 13c (Team Reflection/Active Learning): Epistemic motivation will accentuate the positive relationship between team reflection and the change in one's active learning.

Hypothesis 13d (Team Reflection/Active Teaching): Epistemic motivation will accentuate the positive relationship between team reflection and the change in one's active teaching.

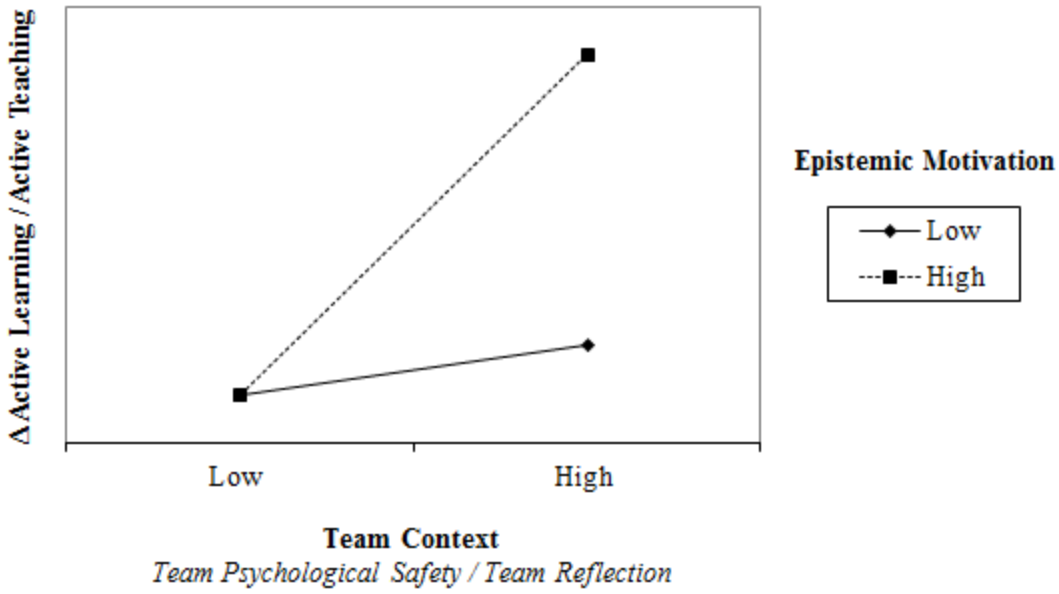

Figure 6. Anticipated Interaction Plot for Hypotheses 13a-13d

Prosocial Motivation. Prosocial motivation is defined as the degree to which individuals consider the characteristics, qualities, values, and success of their collective and thereby increase attention and processing of informational cues within it (De Dreu & Nauta, 2009; De Dreu, et al., 2008). This captures the essence of prosocial motivation as conceptualized by De Dreu et al. (2000) in their aforementioned meta-analysis of negotiation outcomes. As an example of how prosocial motivation influences information processing, De Dreu and Boles (1998) found that prosocially motivated negotiators recalled more cooperative tactics in their negotiations whereas those more concerned about themselves were able to recall more competitive tactics. Similarly, participants in prisoner dilemma games are more attuned to joint gains when prosocially motivated, whereas they are more attuned to their own or relative gains when they are high in proself motivation (Camac, 1992), which refers to individuals being primarily concerned with themselves rather than their collective or counterpart.

From an information processing perspective, epistemic motivation affects the "depth" of information processing (i.e., systematic and deliberate processing) whereas prosocial motivation affects "bias" in information processing in that it influences "the type of information searched, encoded, retrieved, and shared" (De Dreu, et al., 2008, p. 33). Importantly, epistemic motivation and prosocial motivation are believed to be distinct and orthogonal factors (De Dreu, et al., 2008). Thus, an individual who demonstrates epistemic motivation is just as likely to be high or low in the extent to which he or she demonstrates prosocial motivation.

Because prosocial motivation tends to result in concern for, and increased attention toward, one's collective, I argue that individuals who are prosocially motivated are likely to be especially influenced by social informational cues within their team. Further, I expect this to ultimately translate into a greater correspondence between team context (team psychological safety and team reflection) and one's individual learning behavior, both active learning and active teaching. Thus, whereas epistemic motivation was theorized to impact the extent to which team members systematically and deliberately (or "deeply", cf. Zalesny & Ford, 1990) process social informational cues, prosocial motivation is theorized to bias such information processing in that these individuals will be more attuned toward, and receptive of, social informational cues within their team. These predictions are provided more formally as follows:

Hypothesis 14a (Team Psychological Safety/Active Learning): Prosocial motivation will accentuate the positive relationship between team psychological safety and the change in one's active learning.

Hypothesis 14b (Team Psychological Safety/Active Teaching): Prosocial motivation will accentuate the positive relationship between team psychological safety and the change in one's active teaching.

Hypothesis 14c (Team Reflection/Active Learning): Prosocial motivation will accentuate the positive relationship between team reflection and the change in one's active learning.

Hypothesis 14d (Team Reflection/Active Teaching): Prosocial motivation will accentuate the positive relationship between team reflection and the change in one's active teaching.

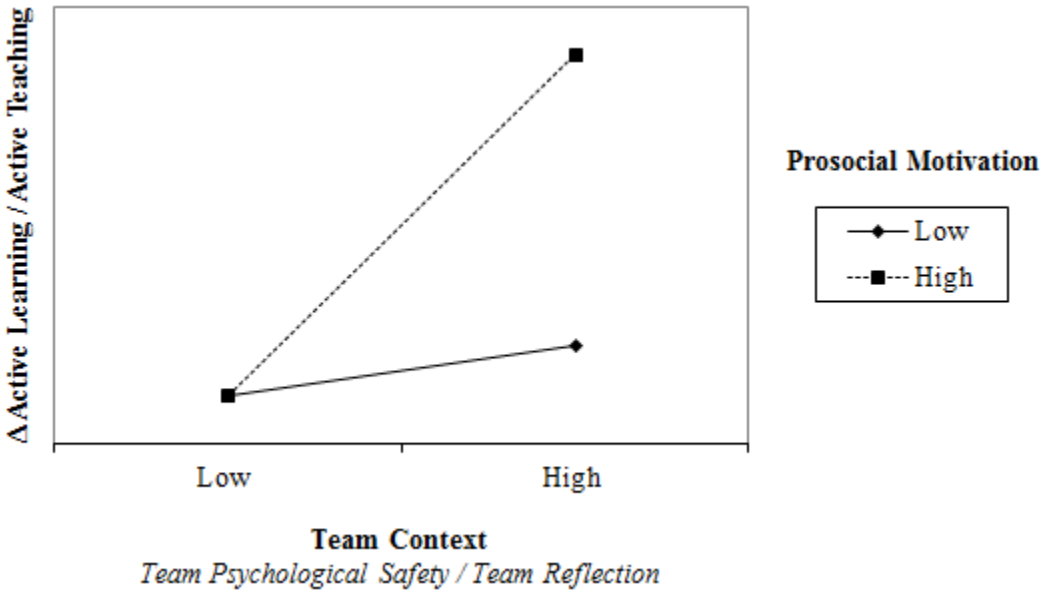

Figure 7. Anticipated Interaction Plot for Hypotheses 14a-14d

To summarize, team learning theory (e.g., Argote, et al., 2001; Edmondson, 1999) suggests that individuals are the fundamental learning unit in a team; however, most studies in the literature focus entirely at the team level and assume homogeneity of learning among team members. By contrast, the current study investigates the variation of learning behavior of individuals within teams. I suggested that two particular forms of learning-oriented behavior exist at the individual level: active learning and active teaching. Both of these behaviors are expected to have relationships with task performance, social status, job satisfaction, and turnover

intentions. In terms of antecedents, I suggested that two especially germane team contextual elements, team psychological safety (Edmondson, 1999) and team reflection (Marks, et al., 2001; West, 1996, 2000), will stimulate both forms of learning behavior via social information processing (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990). Moreover, using a motivated information processing lens (De Dreu, et al., 2008; De Dreu, Weingart, et al., 2000; Kunda, 1990), I hypothesized that two moderators (epistemic and prosocial motivation) will accentuate the relationship between these team contextual elements and both forms of learning behavior.

METHOD

Research Setting and Sample

The context in which teams function is an important consideration for research investigating the processes of team learning (Edmondson, et al., 2007). As such, the current study was conducted in a field setting where teams could be studied in their natural working environments, which helps to preserve external validity (Cook & Campbell, 1979). However, research designs emphasizing external validity often do so at the peril of internal validity. In an effort to achieve a reasonable balance between these contrasting forms of validity, the current study employed a quasi-experimental design (Cook & Campbell, 1979). Quasi-experiments allow not only for a reasonable balance between internal and external validity, they also provide a number of other benefits such as the ability to strengthen causal inference, minimize ethical dilemmas when the treatment is posited to have beneficial effects, and it allows researchers to engage in close collaboration with practitioners, among many other benefits (see Grant & Wall, 2009 for a contemporary discussion regarding the use of quasi-experimentation in the organizational sciences). Further discussion is provided in the Procedure section below.

In exchange for participation, each organization received not only the benefits of a team training intervention; they also were provided with a customized professional report highlighting the results of the study as well as recommendations for improvement within their organization. Finally, as an incentive and token of gratitude for participation, all study participants were entered into a drawing for a $50 cash prize, of which 10 were to be randomly selected to win[3]. Prior to data collection, a power analysis was conducted in order to determine the number of teams required to test study hypotheses. Assuming team sizes of 10 individuals, a moderate

[3] Due to industry standards, one organization decided to opt-out of the cash prize incentive.

effect size (Cohen, 1988) and effect size variability (Raudenbush & Liu, 2000), and an alpha of .05, I determined that approximately 26 teams were required to produce a statistical power of .80 (Raudenbush, Spybrook, Congdon, Liu, & Martinez, 2011).

The initial sample was drawn from five organizations representing the following industries: automotive components manufacturing, government, aerospace engineering, pharmaceutical research and development, and medical imaging. Across these organizations, a total of 35 teams (236 individuals) were included in the initial sample. The teams were very diverse and involved individuals collectively performing tasks such as scientific research, product sales, engineering, firefighting, building inspection, farming, management, city planning, and maintenance. Due to conflicts with work demands, some teams were unable to continue with the study after completing the initial survey, reducing the sample to four organizations (27 teams, 184 individuals)[4]. In addition, one organization included some team leaders who were also members of another team due the hierarchical nature of their organization. To eliminate the problem of statistical non-independence of such duplicate participants, these leaders were removed from all analyses, reducing the number of individuals in the sample to 172.

On average, participants had been a member of their organization for 11.31 years (SD = 9.68) and a member of their team for 4.50 years (SD = 4.84). The mean age of participants was 43.32 years (SD = 10.57). Most participants were male (70.3%) and identified themselves as White/Caucasian (88.5%). In terms of educational level, 43.6% received either a high school degree/GED equivalent or attended some college, 41.1% completed an associate's or bachelor's degree, and 15.2% received a master's or doctoral degree.

[4] The full sample was retained for the purposes of confirmatory factor analyses (CFAs) on the active learning and active teaching items in order to achieve a more accurate estimate of the underlying factor structure of these measures.

Procedure

The current study employed a quasi-experimental research design (Cook & Campbell, 1979) which resembles a randomized experiment but without full control over the assignment of participants or units to conditions. In particular, the design was a variant of the *nonequivalent comparison group* method with *switching replications* (Shadish, Cook, & Campbell, 2002) whereby each team participating in the study was placed into one of two groups. One group of teams (referred to hereafter as *Group 1*) experienced the training intervention during the first time period of the study, whereas the other group (*Group 2*) experienced the training during the second period. This design allowed Group 2 to serve as a comparison against which the effects of the intervention for Group 1 would be assessed, while at the same time allowing Group 2 (the "wait-list control group", cf. Rosenthal & Rosnow, 2008) to eventually receive the training.

When drawing statistical inferences regarding treatment effectiveness in this research design, there is an assumption that any group differences are based on the effects of the treatment rather than other effects (e.g., motivational or contextual differences between the groups). Thus, an important consideration in this research is the strategy by which teams are placed into the two groups. This issue was addressed by employing a matching technique (Shadish, et al., 2002) which refers to efforts by the researcher to minimize pre-existing differences between the groups. Approximately half the teams from each organization were placed into Group 1 and roughly half into Group 2. This approach was driven by the presumption that teams within the same organization have relatively similar contextual influences such as organizational culture and history, human resource policies, industry effects, and other organizationally-relevant factors that might influence perceptions, attitudes, and behaviors. A downside of this design is the potential for undesired treatment ordering effects. For instance, individuals in Group 2 may have felt

excluded by having to wait for the training whereas individuals in Group 1 may have experienced superiority or even guilt in some cases, which has ethical implications as it may stimulate intra-organizational animosity. This concern was addressed by assuring individuals in the study that the order in which training was given was *not* a function of their ability, performance, or other factors indicating preference of any team over another; but rather the order was determined as part of the multi-phasic nature of the research design. They were also assured that all teams would receive the same training regardless of when it is received. Another potential concern with this approach is that individuals in Group 2 might have communicated with their colleagues in Group 1 regarding the treatment before experiencing it, thus potentially biasing their perceptions, attitudes, and behaviors. Asking participants to avoid communication with individuals in other teams regarding the training is likely to, ironically, encourage such behavior. As such, this particular concern for inter-team communication was unavoidable in the present research context. Even though researchers can take great care in their study design, quasi-experimental research always involves trade-offs that must be balanced (Shadish, et al., 2002).

Each participant received an initial (pre-test) survey to measure age, gender, team psychological safety, epistemic motivation, prosocial motivation, active learning, active teaching, job satisfaction, and turnover intentions. In addition, the survey of team leaders included ratings of task performance and social status for each team member.

Next, teams in Group 1 participated in the training intervention approximately one month afterwards, the details of which are discussed in the Training Intervention section below. Roughly one month after this point (and two months after the initial survey), each participant was given a second survey to assess the variables anticipated to change after experiencing the

treatment (active learning, active teaching, job satisfaction, and turnover intentions). Similarly, team leaders were given a survey to detect changes in their ratings of task performance and social status for each team member. The scale instructions for these follow-up measurements contained the following text: *The following items refer to perceptions and behavior over the past month. That is, when forming your responses to these items, keep in mind that they are in reference to perceptions and behavior that has taken place since about a month ago*. The inclusion of these follow-up items allows for a comparison between individuals whose team was in Group 1 (treatment group) and those whose team was in Group 2 (control group).

The final phase of the study involved teams in Group 2 participating in the training intervention approximately one month later. Please refer to Figure 8 for a visual depiction of the research design.

	Pre-test		***Post-test***	
Group 1:	$\mathbf{O_1}$	**X**	$\mathbf{O_2}$	
Group 2:	$\mathbf{O_1}$		$\mathbf{O_2}$	**X**

|---------- (+1 month) ---------- (+2 months) ---------- (+3 months)

Figure 8. Research Design (Note that "O" represents an observation [survey] and "X" represents the treatment [team training intervention])

Training Intervention

The training intervention, referred to as the *Guided Reflection Opportunity Workshop* (or *GROW*), was designed to stimulate and encourage the reflective behavior of teams. Both the design and implementation of the intervention were informed by principles derived from the training literature; that is, the GROW was a structured and planned intervention with the

objective of facilitating job-related competencies of learners (Goldstein & Ford, 2002; Salas & Cannon-Bowers, 1997).

First, regarding the structured nature of the training, each session lasted 90 minutes to allow sufficient time for a systematic, yet interactive discussion led by a facilitator (the author). A worksheet was used to guide the discussion, as described below. The facilitator maintained a structured discussion to ensure that all teams received comparable training; however, input from team members was encouraged. This is important for two reasons. First, engagement is a crucial element of successful training (Noe, Tews, & Dachner, 2010), and therefore encouraging input from team members is likely to facilitate their motivation to learn. Second, implementing the perspectives of team members helped the facilitator couch the content of the training within the environment faced by the team. Recall that the training was intended to improve a generalized team process (in particular, team reflection behavior); however, transition phase processes such as reflection do not occur in a vacuum but rather are focused on action processes such as task execution (Marks, et al., 2001). Thus, a generalized transition process such as reflection necessarily relates to the particular task environment faced by the team.

Second, in terms of planning, the facilitator met with a representative at each organization to explain the details of the training and address any foreseeable issues that might preclude the effectiveness of training (e.g., scheduling conflicts and availability of training resources). In addition, each participant received information prior to the training session such as the training date, time, location, length, and purpose (described as a "teamwork development" session) in order to facilitate readiness for learning.

Third, as for the acquisition of job-related competencies, the most important issue in conducting a training program is the specification of the learning objectives (Gagné, 1962). The

GROW was designed to stimulate and encourage reflection behavior in teams. To this end, the worksheet (see Appendix) provided the organizing framework for the training, structured in terms of both process and content. In terms of process, the literature on reflection (e.g., Loo & Thorpe, 2002) and reflective learning processes (e.g., Boyd & Fales, 1983; Schön, 1987) was used to present three phases of reflection: *awareness*, *analysis*, and *improvement*. First, reflection requires awareness, in that one is knowledgeable regarding past behavior. Recollection of behavior during a given reflection episode makes such behavior salient to the reflector. Next, this awareness informs the analysis during which one scrutinizes the past behavior in order to develop a greater understanding of the behavior itself, as well as its antecedents and consequences. Analysis is crucial because most learning in organizations is "single-loop" (Argyris & Schön, 1978) in that errors are detected and corrected without an understanding of the underlying causes of the errors. Finally, this awareness and analysis allows one to generate ideas regarding team behavioral improvement and plan accordingly.

As for the content of team reflection, the current study relied on theory regarding team processes as they are widely believed to represent the primary means by which teams convert inputs to outputs (Marks, et al., 2001; McGrath, 1984). Hence, teams reflecting on their behavior are likely to be chiefly concerned with issues related to process. As stated by Swezey and Salas (1992), "Essentially, the domain of teamwork deals with process issues", referring to "the techniques or means applied to achieve an anticipated outcome" (p. 222). Drawing from the seminal article on team processes by Marks et al. (2001), the worksheet included three categories of team processes: transition processes (occurring while teams are concerned with evaluation and/or planning activities), action processes (occurring while teams focus on taskwork), and interpersonal processes (activities concerned with relations within the team).

The first transition process included in the worksheet was *Mission analysis formulation and planning*, which refers to the "[i]nterpretation and evaluation of the team's mission, including identification of its main tasks as well as the operative environmental conditions and team resources available for mission execution" (Marks, et al., 2001, p. 363). This is a major element in team reflection behavior, as establishing an overall picture of the team's mission serves as a cornerstone for the reflection of other processes. The second transition process included on the worksheet was *Goal specification* which involves both the identification and prioritization of the team's goals and sub-goals. Goals are believed to be a fundamental element of teams (Guzzo, Salas, & Associates, 1995; Marks, et al., 2001; McGrath, 1991), and hence, reflective activities are likely to tap perceptions regarding goals and/or sub-goals.

In terms of action processes, the worksheet included *Monitoring progress toward goals*. This is a natural extension of the goal specification process as it describes activities such as tracking progress, keeping track of needs to in order to facilitate goal attainment, and making sure team members are aware of this monitoring. Because teams tend to *not* revisit the strategies they develop early in their functioning (Argote, Turner, & Fichman, 1989; Bettenhausen & Murnighan, 1985; Gersick & Hackman, 1990; Hackman & Wageman, 2005), this is a crucial process which research suggests is especially likely to benefit from reflection (West, 1996, 2000). Second, this section included *Team monitoring and backup behavior* which refers to assisting teammates with their tasks. As interdependence is a defining characteristic of groups (Cartwright & Zander, 1968; Shea & Guzzo, 1987), reflecting on this process is likely to be important for both teamwork and taskwork effectiveness.

Finally, with regard to interpersonal processes, the current study employed *Conflict management* and *Motivation and confidence building*. Unmanaged interpersonal issues can

undermine the effectiveness of groups (Jehn, 1997). Moreover, as conflict and motivational issues can often be laden with negative emotions, they may affect a team's ability to reflect on past events. This is supported by research by Forgas (1994) who found that attributions for conflict in close relationships were affected by one's mood. Hence, the inclusion of conflict management and motivation/confidence activities is likely to facilitate the ability of teams to effectively engage in reflection even after the training.

Although many other team processes have been introduced in the literature, these particular ones were chosen because they are believed to be the most relevant to team reflection behavior. The effectiveness of team reflection may be thwarted if processes reflected upon are rather uncontrollable by the team. For instance, the process of *Strategy formulation* from Marks et al. (2001) is probably not very malleable for most teams once a given strategy has been established (perhaps assigned by upper management) and routinized. As such, concentrating reflection on such a process was not likely as fruitful as the others highlighted above.

I acknowledge that other viable processes, besides the ones chosen, could have been included in the GROW intervention; however, recent research on team processes suggests that the particular inclusion of certain processes over others may be rather inconsequential. For instance, some researchers have included survey items tapping the three process categories highlighted above (transition, action, and interpersonal), finding that they actually represent a higher-order team process construct (e.g., Mathieu, et al., 2006; Mathieu & Taylor, 2007). This was confirmed in a recent meta-analysis (LePine, et al., 2008) which found that individual teamwork processes loaded onto a three-factor structure (as Marks, et al., 2001 would suggest); however, these factors actually loaded onto a general teamwork process factor. To guide future work on team processes, LePine et al. (2008) advocated the "compatibility principle" (Fishbein

& Ajzen, 1974), namely that the level at which one considers team processes should be determined by the objective of the given research. As the current study involved teams reflecting on their past behavior, this represents a rather high-level approach to team processes and hence a representative selection of key team processes expected to relate to team reflection was the approach used in this study.

Measures

The measures used in the study are described below. Please contact the author for a list of the items used in each scale.

Active Learning

Surveys asked participants to report the extent to which they engage in active learning within their team. Items for this measure were adapted from Edmondson (1999). An example item is "I ask teammates for feedback on my performance". The alpha reported by Edmondson (1999) for the original measure was .78.

Active Teaching

Surveys also asked participants to report the extent to which they engage in active teaching within their team. As this is also fundamentally about learning-oriented behavior, differing from active learning primarily by whether the learning is directed at oneself or others, this measure was similarly adapted from Edmondson (1999). An example item is "I provide teammates with feedback on their performance". As mentioned above, the alpha reported by Edmondson (1999) for the original measure was .78.

Task Performance

The team leaders conducted task performance ratings for each member of the team. The four highest-loading items from the in-role performance sub-scale of Williams and Anderson

(1991) was used for this purpose, following Van Dyne and LePine (1998). An example item is "This particular employee fulfills the responsibilities specified in his/her job description". The latter authors reported alpha levels between .96 and .97 for supervisor ratings using this scale. To reduce the likelihood of conflation between in-role and extra-role performance assessments, a measure of helping behavior (Van Dyne & LePine, 1998) was included prior to the in-role performance items for each team leader survey.

Social Status

As with task performance above, a measure of social status was conducted by the leader of each team. Following other organizational researchers (e.g., Venkataramani, Green, & Schleicher, 2010), social status was measured by adapting three items from the perceived supervisory status scale of Eisenberger et al. (2002). An example item is "The team holds this particular employee in high regard." Venkataramani et al. (2010) reported an alpha of .87 for this measure.

Job Satisfaction

To measure job satisfaction, participants were asked to complete the 8-item Abridged Job in General Scale (Russell et al., 2004). This scale asks respondents to indicate whether various words or phrases describe their job in general (e.g., "good" and "better than most"). Russell et al. (2004) reported alphas of .85 and above for this measure.

Turnover Intentions

As a measure of turnover intentions, participants completed the 4-item scale based on O'Reilly, Chatman, and Caldwell (1991). An example item is "I have thought seriously about changing organizations since beginning to work here". Edwards and Cable (2009) reported an alpha of .78 for this scale.

Team Psychological Safety

Participants completed an adaptation of Edmondson's (1999) 7-item measure of team psychological safety. An example item is the following: "It is safe to take a risk on this team." Edmondson reported an alpha of .82 in her study. Individual responses to this measure were aggregated to a team-level construct, as reported later.

Epistemic Motivation

The need for cognition (Cacioppo & Petty, 1982) construct is representative of epistemic motivation (De Dreu, et al., 2008). Cacioppo, Petty, Feinstein, and Jarvis (1996) define this trait as "a stable individual difference in people's tendency to engage in and enjoy effortful cognitive activity" (p. 198). Individuals high in need for cognition are especially likely to be attuned to informational cues in their environment. In their review and meta-analysis of research on need for cognition, Cacioppo et al. (1996) concluded that individuals high in this trait tend to acquire, seek, and think about information in order to make sense of their world. For instance, need for cognition is associated with the tendency to seek a wider range of information about issues, tasks, and current events as compared to individuals low in the trait (Cacioppo, et al., 1996). In addition, managers are better able to realize the benefits from their social network to the extent that they are high in need for cognition (Anderson, 2008). Further, research has found that teams high in this trait are better able to leverage age and educational diversity in teams (Kearney, Gebert, & Voelpel, 2009), ostensibly because of an increased understanding of individuals and team context. As this theory and research suggests, team members are likely impacted by social informational cues stemming from their team environment to the extent that they are high in need for cognition.

The 18-item scale by Cacioppo, Petty and Kao (1984) was used to assess need for cognition for each participant. An example item is "I like to have the responsibility of handling a situation that requires a lot of thinking". Minbashian, Wood and Beckmann (2010) reported an alpha of .84 for this scale.

Prosocial Motivation

Team identification (Ashforth & Mael, 1989; Tajfel, 1978; Tajfel & Turner, 1979) is argued to represent prosocial motivation in a team context (De Dreu, et al., 2008). Identification, "the perception of oneness or belongingness to some human aggregate" (Ashforth & Mael, 1989, p. 21), provides a sense of self-enhancement by being associated with a valued group in addition to a reduction of uncertainty regarding one's perceptions, attitudes, feelings, and behavior (Hogg & Terry, 2000). Thus, identifying with a team promotes activities that are congruent with the identity of one's group (van Knippenberg & Hogg, 2003). In fact, as an individual strongly identifies with a collective, the defining characteristics of the collective actually become a part of the individual's self-concept (Cooper & Thatcher, 2010; Dutton, Dukerich, & Harquail, 1994).

Reflecting this notion that individuals identifying with their team attach more value and importance to the team, social identity theory suggests that team identification is likely to impact the manner in which team members process information from their social environment, as "identity situates the person in a given context, delimiting a set of cognitions, affect, and behaviors…In the study of human cognition and behavior, identity is one of the key foundational concepts helping to explain why people think about their environments the way they do and why people do what they do in these environments" (Ashforth, Harrison, & Corley, 2008, p. 334). Moreover, Sluss and Ashforth (2008) argued that identification with a collective is positively related to the extent to which one is susceptible to social influence from others within the

collective. As this body of work suggests, team members are likely impacted by social informational cues stemming from their team environment to the extent that they identify with their team.

Participants completed a 6-item measure of team identification adapted from Mael and Ashforth (1992). An example item is "When someone criticizes this team, it feels like a personal insult". These authors reported an alpha of .87 in their study.

Control Variables

Age. Age has been linked to performance-related variables in past research (e.g., Schaubroeck, Lam, & Cha, 2007), and therefore this was treated as a control variable in the present study.

Gender. Gender has also been linked to performance-related variables in past research (e.g., Schaubroeck, et al., 2007), and hence this was included as a control variable as well.

Team size. Team size was used as a control variable as previous research suggests that while increases in team size are sometimes associated with increases in productivity (up to a certain point), they also tend to result in inefficiencies such as social loafing, decreased decision-making effectiveness, increased levels of conformity, and coordination difficulties (Gooding & Wagner, 1985; Steiner, 1972). Team size is also associated with the tendency to discuss shared rather than unique information held by group members (Stasser, Vaughan, & Stewart, 2000). From this research, it is reasonable to suspect that these process losses might preclude effective team reflection behavior. However, team size is positively correlated with the amount of cognitive resources available to teams (Bantel & Jackson, 1989), which may facilitate the cognitively-based process of reflection. Moreover, larger teams tend to benefit more from team building interventions rather than smaller teams (Klein et al., 2009) although it is unclear to what

extent this holds for individual-level outcomes. In addition, Sarin and McDermott (2003) found a negative relationship between team size and learning. Overall, team size was controlled for in the present study as it may have influenced both team reflection and the training intervention itself as well as team member outcomes.

Data Analytic Strategy

Team psychological safety (Edmondson, 1999) is considered a shared property (Kozlowski & Klein, 2000) that is experienced by each individual within a given team. As this particular construct is measured at the individual level of analysis, one must justify the aggregation of such individual responses to the team level. To this end, I planned to compute the r_{wg} agreement index (James, Demaree, & Wolf, 1993). I also planned to compute the intraclass correlation coefficient (ICC) as an indication of whether individual perceptions of team psychological safety are sufficiently reliable to model the effects at the team level (Bliese, 2000). Note that these statistics are reported below.

The proposed conceptual model is multi-level in nature, as both team psychological safety and team reflection were expected to impact individual-level outcomes. Moreover, participants were nested within teams. Thus, some participants shared team-level influences which must be accounted for in statistical analyses; otherwise the independence assumption among observations in ordinary least squares (OLS) would be violated. Hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) was used to test hypotheses as it utilizes error terms that control for the dependency inherent in nested data. In particular, a regression equation is calculated for each individual at level 1. Then, both the intercept and slope scores at Level 1 are used as the dependent variables for level 2 predictors. In this way, HLM partitions the variance of individual-level outcomes into both individual-level (i.e., level 1) and team-level

(i.e., level 2) components. Grand-mean centering was conducted on level 1 and level 2 predictors to facilitate the interpretation of coefficients (Hofmann & Gavin, 1998). Finally, below are the multi-level regression equations used to test the study hypotheses, organized by relevant dependent variable.

Task Performance (Hypotheses 1, 5, and 9)

$\underline{Level\ 1}$: $(\text{Task Performance}_{t2})_{ij} = \beta_{0j} + \beta_{1j}(\text{Age}) + \beta_{2j}(\text{Gender}) + \beta_{3j}(\text{Task Performance}_{t1}) + \beta_{4j}(\text{Active Learning}_{t1}) + \beta_{5j}(\text{Active Teaching}_{t1}) + \beta_{6j}(\text{Active Learning}_{t1} \times \text{Active Teaching}_{t1}) + r_{ij}$

$\underline{Level\ 2}$: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Team Size}) + U_{0j}$ $\quad \beta_{1j} = \gamma_{10} + U_{1j}$ $\quad \beta_{2j} = \gamma_{20} + U_{2j}$

$\beta_{3j} = \gamma_{30} + U_{3j}$ $\quad \beta_{4j} = \gamma_{40} + U_{4j}$ $\quad \beta_{5j} = \gamma_{50} + U_{5j}$ $\quad \beta_{6j} = \gamma_{60} + U_{6j}$

Social Status (Hypotheses 2, 6, and 10)

$\underline{Level\ 1}$: $(\text{Social Status}_{t2})_{ij} = \beta_{0j} + \beta_{1j}(\text{Age}) + \beta_{2j}(\text{Gender}) + \beta_{3j}(\text{Social Status}_{t1}) + \beta_{4j}(\text{Active Learning}_{t1}) + \beta_{5j}(\text{Active Teaching}_{t1}) + \beta_{6j}(\text{Active Learning}_{t1} \times \text{Active Teaching}_{t1}) + r_{ij}$

$\underline{Level\ 2}$: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Team Size}) + U_{0j}$ $\quad \beta_{1j} = \gamma_{10} + U_{1j}$ $\quad \beta_{2j} = \gamma_{20} + U_{2j}$

$\beta_{3j} = \gamma_{30} + U_{3j}$ $\quad \beta_{4j} = \gamma_{40} + U_{4j}$ $\quad \beta_{5j} = \gamma_{50} + U_{5j}$ $\quad \beta_{6j} = \gamma_{60} + U_{6j}$

Job Satisfaction (Hypotheses 3, 7, and 11)

$\underline{Level\ 1}$: $(\text{Job Satisfaction}_{t2})_{ij} = \beta_{0j} + \beta_{1j}(\text{Age}) + \beta_{2j}(\text{Gender}) + \beta_{3j}(\text{Job Satisfaction}_{t1}) + \beta_{4j}(\text{Active Learning}_{t1}) + \beta_{5j}(\text{Active Teaching}_{t1}) + \beta_{6j}(\text{Active Learning}_{t1} \times \text{Active Teaching}_{t1}) + r_{ij}$

$\underline{Level\ 2}$: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Team Size}) + U_{0j}$ $\quad \beta_{1j} = \gamma_{10} + U_{1j}$ $\quad \beta_{2j} = \gamma_{20} + U_{2j}$

$\beta_{3j} = \gamma_{30} + U_{3j}$ $\quad \beta_{4j} = \gamma_{40} + U_{4j}$ $\quad \beta_{5j} = \gamma_{50} + U_{5j}$ $\quad \beta_{6j} = \gamma_{60} + U_{6j}$

Turnover Intentions (Hypotheses 4, 8, and 12)

$\underline{Level\ 1}$: $(\text{Turnover Intentions}_{t2})_{ij} = \beta_{0j} + \beta_{1j}(\text{Age}) + \beta_{2j}(\text{Gender}) + \beta_{3j}(\text{Turnover Intentions}_{t1}) + \beta_{4j}(\text{Active Learning}_{t1}) + \beta_{5j}(\text{Active Teaching}_{t1}) + \beta_{6j}(\text{Active Learning}_{t1} \times \text{Active Teaching}_{t1}) + r_{ij}$

$\underline{Level\ 2}$: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Team Size}) + U_{0j}$ $\quad \beta_{1j} = \gamma_{10} + U_{1j}$ $\quad \beta_{2j} = \gamma_{20} + U_{2j}$

$\beta_{3j} = \gamma_{30} + U_{3j}$ $\quad \beta_{4j} = \gamma_{40} + U_{4j}$ $\quad \beta_{5j} = \gamma_{50} + U_{5j}$ $\quad \beta_{6j} = \gamma_{60} + U_{6j}$

Active Learning (Hypotheses 13a, 13c, 14a, and 14c)

<u>*Level 1*</u>: $(\text{Active Learning}_{t2})_{ij} = \beta_{0j} + \beta_{1j}\,(\text{Age}) + \beta_{2j}\,(\text{Gender}) + \beta_{3j}\,(\text{Active Learning}_{t1}) + \beta_{4j}\,(\text{Epistemic Motivation}) + \beta_{5j}\,(\text{Prosocial Motivation}) + r_{ij}$

<u>*Level 2*</u>: $\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{Team Size}) + \gamma_{02}\,(\text{Team Psychological Safety}) + \gamma_{03}\,(\text{Team Reflection}) + U_{0j}$

$\beta_{1j} = \gamma_{10} + U_{1j}$ $\beta_{2j} = \gamma_{20} + U_{2j}$ $\beta_{3j} = \gamma_{30} + U_{3j}$

$\beta_{4j} = \gamma_{40} + \gamma_{41}\,(\text{Team Psychological Safety}) + \gamma_{42}\,(\text{Team Reflection}) + U_{4j}$

$\beta_{5j} = \gamma_{50} + \gamma_{51}\,(\text{Team Psychological Safety}) + \gamma_{52}\,(\text{Team Reflection}) + U_{5j}$

Active Teaching (Hypotheses 13b, 13d, 14b, and 14d)

<u>*Level 1*</u>: $(\text{Active Teaching}_{t2})_{ij} = \beta_{0j} + \beta_{1j}\,(\text{Age}) + \beta_{2j}\,(\text{Gender}) + \beta_{3j}\,(\text{Active Teaching}_{t1}) + \beta_{4j}\,(\text{Epistemic Motivation}) + \beta_{5j}\,(\text{Prosocial Motivation}) + r_{ij}$

<u>*Level 2*</u>: $\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{Team Size}) + \gamma_{02}\,(\text{Team Psychological Safety}) + \gamma_{03}\,(\text{Team Reflection}) + U_{0j}$

$\beta_{1j} = \gamma_{10} + U_{1j}$ $\beta_{2j} = \gamma_{20} + U_{2j}$ $\beta_{3j} = \gamma_{30} + U_{3j}$

$\beta_{4j} = \gamma_{40} + \gamma_{41}\,(\text{Team Psychological Safety}) + \gamma_{42}\,(\text{Team Reflection}) + U_{4j}$

$\beta_{5j} = \gamma_{50} + \gamma_{51}\,(\text{Team Psychological Safety}) + \gamma_{52}\,(\text{Team Reflection}) + U_{5j}$

RESULTS

Confirmatory Factor Analysis

This study employed measures that have been validated in previous research; however, the active learning and active teaching scales were adapted from a single measure of team learning behavior developed by Edmondson (1999). Therefore, it is important to empirically establish that these items represent two constructs rather than one. To this end, I conducted a confirmatory factor analysis (CFA) to compare a two-factor model (representing the active learning and active teaching latent constructs) with a model in which the items load onto a common factor. This comparison was performed for the measurements that occurred at time 1 because the sample size was substantially larger than for time 2, allowing for a more accurate representation of the underlying factor structure.

Refer to Table 1 for the χ^2 value with the associated degrees of freedom (df), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Normed Fit Index (NFI), and Root Mean Square of Approximation (RMSEA) for the two- and one-factor models. These results suggest that the two-factor model was superior (χ^2 = 323.8, df = 76 vs. 483.6, df = 77; CFI = .800 vs. .672; GFI = .768 vs. .707; NFI = .757 vs. .637; RMSEA = .126 vs. .160). A chi-square difference test confirmed that the two-factor solution fit the data sufficiently better than a common factor model ($\Delta\chi^2$ = 159.8, 1 df, $p < .01$).

Model	χ^2 (df)	CFI	GFI	NFI	RMSEA
Two-factor	323.8 (76)	.800	.768	.757	.126
One-factor	483.6 (77)	.672	.707	.637	.160

Notes:
N = 206
χ^2 = Chi-square, df = degrees of freedom, CFI = Comparative Fit Index
GFI = Goodness of Fit Index, NFI = Normed Fit Index
RMSEA = Root Mean Square Error of Approximation

Table 1. Confirmatory Factor Analysis Comparing Two-Factor and One-Factor Models of the Active Learning and Active Teaching Items

Note that according to fit indices, the overall fit of the two-factor model was not ideal; however, I retained the active learning and active teaching scales for three primary reasons. First, the most dominant measure of team learning is that of Edmondson (1999); therefore, because my theoretical development of active learning and active teaching is rooted deeply in team learning theory, it is important for the measurement of these constructs to be firmly in line with the empirical research upon which they are based – regardless of how the CFA may have fared in this particular study. Second, and similarly, it is possible that the sample size in this study did not allow for a sufficiently robust CFA for the purpose of scale evaluation; thus, a larger sample may have revealed improved fit indices. It is noteworthy that the reliability estimates (α) for the active learning and active teaching scales were well-above the commonly accepted .70 threshold (α = .83 and .84, respectively). Finally, one potential method of improving the overall fit of a structural equation model is to reduce the number of parameters to be estimated. Thus, the overall fit of the CFA may be improved to the extent that active learning and active teaching items are removed from the model; however, this approach includes the risk of substantially

distorting the content of the reduced measure[5]. In sum, due to these reasons, I retained the active learning and active teaching measures throughout the study.

Descriptive Statistics and Relationships among Study Variables

Table 2 presents the means, standard deviations, internal consistency reliabilities, and intercorrelations among level 1 variables. First, note that the variables assessed at both time 1 and time 2 demonstrated high correlations between the occasions (active learning: $r = .51$, $p < .05$; active teaching: $r = .55$, $p < .05$; task performance: $r = .63$, $p < .05$; social status: $r = .59$, $p < .05$; job satisfaction: $r = .49$, $p < .05$; and turnover intentions: $r = .66$, $p < .05$), providing evidence that these measures were relatively stable over time. Second, note that active learning and active teaching are positively correlated ($r = .51$, $p < .05$), as expected since both are fundamentally rooted in knowledge, differing by whether the knowledge is acquired from, or shared with, others. Additionally, the table shows that the internal consistency reliabilities for each scale were above the commonly used .70 threshold for inferring an acceptable level of agreement.

[5] Please refer to the Discussion section for a supplemental analysis that employs this scale reduction technique.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	43.32	10.57	--															
2. Gender	.70	.46	-.17*	--														
3. Epistemic Motivation	3.56	.56	-.22*	.16	(.88)													
4. Prosocial Motivation	3.93	.65	-.10	-.12	.10	(.78)												
5. Active Learning$_{t1}$	3.73	.63	-.08	-.12	.27*	.43*	(.83)											
6. Active Learning$_{t2}$	3.77	.55	-.09	-.11	.17*	.14	.51*	(.80)										
7. Active Teaching$_{t1}$	3.58	.65	.00	-.03	.24*	.28*	.51*	.40*	(.84)									
8. Active Teaching$_{t2}$	3.65	.66	-.05	-.03	.11	.16	.32*	.68*	.55*	(.85)								
9. Task Performance$_{t1}$	4.35	.71	.03	-.29*	.00	.04	.10	.05	.12	.13	(.97)							
10. Task Performance$_{t2}$	4.22	.89	.16	-.31*	-.05	.08	.10	.14	.10	.21*	.63*	(.97)						
11. Social Status$_{t1}$	3.96	.91	.09	-.14	-.08	.12	.13	.08	.29*	.26*	.50*	.43*	(.92)					
12. Social Status$_{t2}$	4.03	.95	.07	-.24*	-.01	.22*	.17*	.14	.17*	.31*	.52*	.81*	.59*	(.95)				
13. Job Satisfaction$_{t1}$	4.15	.73	.12	.00	.11	.33*	.40*	.20*	.30*	.23*	.16	.17	.21*	.24*	(.93)			
14. Job Satisfaction$_{t2}$	4.07	.85	-.02	-.06	.19*	.25*	.23*	.24*	.18*	.19*	.22*	.24*	.19*	.18*	.49*	(.95)		
15. Turnover Intentions$_{t1}$	2.07	1.01	-.05	-.05	.03	-.24*	-.19*	-.03	-.07	-.08	-.19*	-.23*	-.18*	-.23*	-.59*	-.37*	(.82)	
16. Turnover Intentions$_{t2}$	2.01	1.04	-.09	-.04	-.06	-.17	-.23*	-.20*	-.10	-.20*	-.19*	-.21*	-.13	-.17	-.44*	-.58*	.66*	(.84)

Notes:

* $p < .05$, two-tailed. N = 115 - 158. Gender coded 1 for male, 0 female

M = Mean, SD = Standard Deviation

Internal consistency reliability (α) is provided on the diagonal for the relevant scales

Table 2. Descriptive Statistics and Relationships among Level 1 Variables

Turning now to the level 2 variables, as team psychological safety is considered a shared property (Kozlowski & Klein, 2000) and yet is measured at the individual level of analysis, I computed the r_{wg} agreement index (James, et al., 1993) in order to justify aggregation to the team level. This analysis confirmed a sufficient level of agreement (mean r_{wg} = .80). Displayed in Table 3 are the means, standard deviations, internal consistency reliabilities, and intercorrelations among the level 2 variables. Note that team size was negatively correlated with team psychological safety ($r = -.52$, $p < .05$), suggesting that team members tend to feel a greater degree of comfort in taking interpersonal risks to the extent that they are in a small team. Additionally, there was an acceptable level of internal consistency reliability for the team psychological safety measure ($\alpha = .83$).

Variable	M	SD	1	2	3
1. Team Size	6.81	2.27	--		
2. Team Psychological Safety	3.77	.46	-.52*	(.83)	
3. Team Reflection	.48	.51	-.02	-.04	--

Notes:
* $p < .05$, two-tailed. N = 27
Team Reflection coded 1 for participation in training intervention, 0 for control group
M = Mean, SD = Standard Deviation
Internal consistency reliability (α) is provided on the diagonal for the relevant scale

Table 3. Descriptive Statistics and Relationships among Level 2 Variables

As study hypotheses will be tested via hierarchical linear modeling (Raudenbush & Bryk, 2002), it is important to first verify a multilevel structure of the data before proceeding. Table 4 provides the null model variance estimates for the variables. First, note that there is a sizable amount of variance in psychological safety across teams (ICC[1] = .15, ICC[2] = .48), consistent

with the fairly large mean r_{wg} value reported earlier for this variable. Additionally, there are relatively little differences across teams in the initial measurement of both active learning (ICC[1] <.01, ICC[2] <.01) and active teaching (ICC[1] = .06, ICC[2] = .28), an indication of within-team heterogeneity of these variables, as argued throughout my theoretical development of these constructs. In comparing these two constructs directly, however, it is interesting to note that there appear to be greater between-team differences in active teaching. Overall, this analysis confirms a multilevel structure of the data, and thus I proceeded with hierarchical linear modeling to test study hypotheses.

	Intraclass Correlation Coefficient	
Measure	ICC(1)	ICC(2)
Age	.38	.76
Gender	.23	.62
Psychological Safety	.15	.48
Epistemic Motivation	.07	.29
Prosocial Motivation	<.01	<.01
Active Learning$_{t1}$	<.01	<.01
Active Learning$_{t2}$	.08	.29
Active Teaching$_{t1}$	.06	.28
Active Teaching$_{t2}$	.19	.52
Task Performance$_{t1}$	.26	.65
Task Performance$_{t2}$	.50	.83
Social Status$_{t1}$	.12	.44
Social Status$_{t2}$	.43	.79
Job Satisfaction$_{t1}$	.05	.21
Job Satisfaction$_{t2}$	<.01	<.01
Turnover Intentions$_{t1}$	<.01	<.01
Turnover Intentions$_{t2}$	<.01	<.01

Notes:
N (Level 1: time 1, time 2) = 152-158, 135-152
N (Level 2: time 1, time 2) = 26-27, 27

Table 4. Null Model Variance Estimates

Effects of Active Learning and Active Teaching

Table 5 displays the effects of active learning and active teaching on changes in team member outcomes. First, with regard to active learning, Hypothesis 1 predicted that it would be related to an increase in task performance. Results suggest that after accounting for the control variables, active learning was not associated with a change in task performance (γ_{40} = .01, n.s.). Thus, the hypothesis was not supported with the data. Next, Hypothesis 2 stated that active learning would be related to a decrease in social status. Results indicate that after accounting for the control variables, active learning was unrelated to a change in social status (γ_{40} = .07, n.s.). Thus, Hypothesis 2 was not supported. Hypothesis 3 posited that active learning would be related to an increase in job satisfaction. Analyses indicate that after accounting for the controls, active learning was unrelated to a change in job satisfaction (γ_{40} = .04, n.s.). Finally, Hypothesis 4 predicted that active learning would be related to a decrease in turnover intentions. Results indicate that after accounting for the control variables, active learning was, in fact, not associated with a change in turnover intentions (γ_{40} = -.15, n.s.). To summarize the group of active learning results, Hypotheses 1-4 were not supported by the data.

Predictor	Task Perf$_{t2}$		Social Status$_{t2}$		Job Sat$_{t2}$		Turnover Int$_{t2}$	
	γ	*SE*	*γ*	*SE*	*γ*	*SE*	*γ*	*SE*
Intercept (γ_{00})	.15*	.07	.11	.14	.12*	.07	.11	.12
Team Size (γ_{01})	-.01	.02	.02	.03	<.01	.02	-.01	.03
Age (γ_{10})	.01*	<.01	<.01	<.01	-.01	.01	-.01	.01
Gender (γ_{20})	-.16*	.09	-.20*	.10	-.17*	.09	-.11	.14
Task Performance$_{t1}$(γ_{30})	.74*	.13						
Hypothesis 1 : Active Learning$_{t1}$ (γ_{40})	.01	.05						
Hypothesis 5 : Active Teaching$_{t1}$ (γ_{50})	.11	.09						
Hypothesis 9 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})	.12*	.06						
Social Status$_{t1}$(γ_{30})			.62*	.08				
Hypothesis 2 : Active Learning$_{t1}$ (γ_{40})			.07	.07				
Hypothesis 6 : Active Teaching$_{t1}$ (γ_{50})			.05	.12				
Hypothesis 10 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})			-.07	.12				
Job Satisfaction$_{t1}$(γ_{30})					.65*	.11		
Hypothesis 3 : Active Learning$_{t1}$ (γ_{40})					.04	.14		
Hypothesis 7 : Active Teaching$_{t1}$ (γ_{50})					.09	.12		
Hypothesis 11 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})					.09	.17		
Turnover Intentions$_{t1}$(γ_{30})							.70*	.06
Hypothesis 4 : Active Learning$_{t1}$ (γ_{40})							-.15	.14
Hypothesis 8 : Active Teaching$_{t1}$ (γ_{50})							.09	.11
Hypothesis 12 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})							-.10	.12
N (Level 1)	128		128		124		124	
N (Level 2)	26		26		27		27	

Notes:
* p < .05, one-tailed. Gender coded 1 for male, 0 female
SE = Standard Error, AL = Active Learning, AT = Active Teaching

Table 5. Effects of Active Learning and Active Teaching on Changes in Team Member Outcomes

Turning now to the group of active teaching results, Hypothesis 5 predicted that active teaching would be related to a decrease in task performance. Results indicate that after accounting for the control variables, active teaching was not associated with a change in task performance (γ_{50} = .11, n.s.), counter to the prediction. Hypothesis 6 posited that active teaching would be related to an increase in social status. Analyses suggest that after accounting for the controls, active teaching was unrelated to a change in social status (γ_{50} = .05, n.s.). Next, Hypothesis 7 predicted that active teaching would be related to an increase in job satisfaction. Results indicate that after accounting for the control variables, active teaching was, in fact, unrelated to a change in job satisfaction (γ_{50} = .09, n.s.). Lastly, Hypothesis 8 stated that active teaching would be related to a decrease in turnover intentions. Data analyses suggest that after accounting for the controls, active teaching was not related to a change in turnover intentions (γ_{50} = .09, n.s.). To summarize the active teaching results, Hypotheses 5-8 were not supported by study data.

The next group of results focuses on the interactive effects of active learning and active teaching. To test these same-level moderating effects, an interaction term was created and entered into the level 1 equations to examine its influence on the dependent variables of interest. First, Hypothesis 9 predicted that active learning and active teaching would have an interactive effect on the change in one's task performance such that the positive relationship between active learning and the change in task performance would be neutralized when active teaching is also high. Results indicated that after accounting for the control variables, the interaction term was significant (γ_{60} = .12, $p < .05$). As shown in Figure 9, the relationship between active learning

and a change in task performance was influenced by active teaching[6]. However, the interaction pattern was not anticipated, as active learning appears to be associated with an increase in task performance to the extent that active teaching is *high* rather than low. Thus, contrary to the prediction that active teaching would act as a neutralizer of the positive influence of active learning on task performance, it actually appears to have accentuated the relationship. As such, the hypothesis was not supported by study data. Next, Hypothesis 10 posited that active learning and active teaching would have an interactive effect on the change in one's social status such that the positive relationship between active teaching and the change in social status would be neutralized when active learning is high. Data analyses suggested that after accounting for the control variables, the interaction term was not significant (γ_{60} = -.07, n.s.); and thus the hypothesis was not supported. Next, Hypothesis 11 stated that active learning and active teaching would have an interactive effect on the change in one's job satisfaction such that the positive relationship between active learning and the change in job satisfaction would be accentuated when active teaching is high. Analyses revealed that after accounting for the control variables, the interaction term was not significant (γ_{60} = .09, n.s.). Finally, Hypothesis 12 predicted that active learning and active teaching would have an interactive effect on the change in one's turnover intentions such that the negative relationship between active learning and the change in turnover intentions would be accentuated when active teaching is also high. Results indicated that after accounting for the control variables, the interaction term was not significant (γ_{60} = -.10, n.s.), and thus the prediction was not supported. To summarize the results of the interactive

[6] For this and all subsequent interaction plots, "high" and "low" represent +1 and -1 standard deviation, respectively, of the given interaction term.

effects of active learning and active teaching, Hypotheses 9-12 failed to receive support from the data.

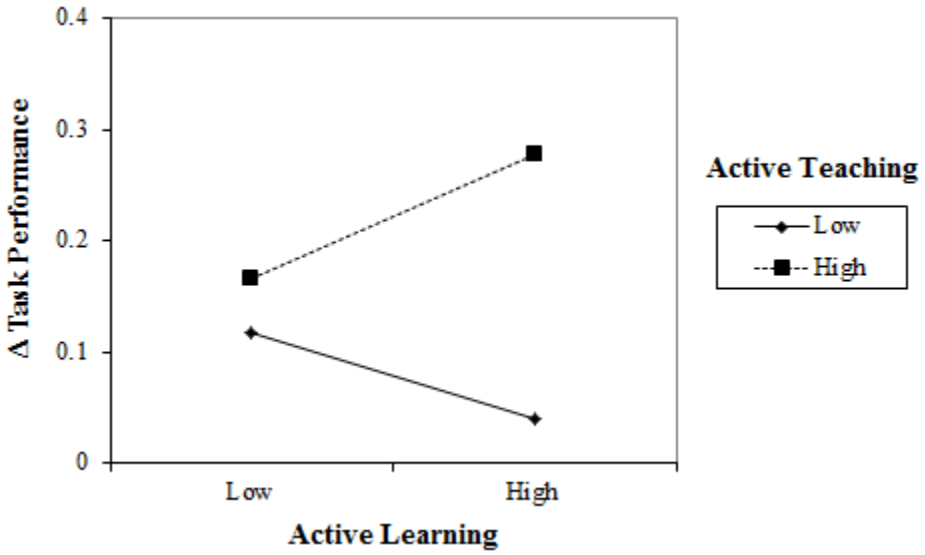

Figure 9. Interactive Effects of Active Learning and Active Teaching on a Change in Task Performance

Moderated Influence of Team Context on Active Learning and Active Teaching

Displayed in Table 6 are the results of the moderated influence of team context on active learning and active teaching. To test these cross-level moderating effects, the team context variables – team psychological safety (Hypotheses 13a, 13b, 14a, and 14b) and team reflection (Hypotheses 13c, 13d, 14c, and 14d) – were entered into the level 2 equations in order to test their effects on the slope of the relevant level 1 variables of interest: epistemic motivation (Hypotheses 13a, 13c, 14a, and 14c) and prosocial motivation (Hypotheses 13b, 13d, 14b, and 14d).

Predictor	Active Learning$_{t2}$		Active Teaching$_{t2}$	
	γ	*SE*	*γ*	*SE*
Intercept (γ_{00})	-.04	.09	-.06	.15
Team Size (γ_{01})	-.02	.02	-.04	.03
Team Psychological Safety (γ_{02})	-.13	.08	-.03	.12
Team Reflection (γ_{03})	.04	.07	-.02	.11
Age (γ_{10})	<.01	<.01	<.01	.01
Gender (γ_{20})	-.03	.09	.05	.13
Active Learning$_{t1}$ (γ_{30})	.55*	.08		
Epistemic Motivation (γ_{40})	-.06	.10		
Hypothesis 13a : Team Psychological Safety (γ_{41})	-.28	.24		
Hypothesis 13c : Team Reflection (γ_{42})	-.03	.21		
Prosocial Motivation (γ_{50})	-.12	.10		
Hypothesis 14a : Team Psychological Safety (γ_{51})	-.10	.09		
Hypothesis 14c : Team Reflection (γ_{52})	-.01	.13		
Active Teaching$_{t1}$ (γ_{30})			.55*	.06
Epistemic Motivation (γ_{40})			-.05	.11
Hypothesis 13b : Team Psychological Safety (γ_{41})			-.30	.22
Hypothesis 13d : Team Reflection (γ_{42})			-.19	.20
Prosocial Motivation (γ_{50})			.07	.08
Hypothesis 14b : Team Psychological Safety (γ_{51})			-.16	.12
Hypothesis 14d : Team Reflection (γ_{52})			-.13	.11
N (Level 1)	127		127	
N (Level 2)	27		27	

Notes:

* p < .05, one-tailed. Gender coded 1 for male, 0 female

Team Reflection coded 1 for team participation in training, 0 for control group

SE = Standard Error

Table 6. Moderated Influence of Team Context on Changes in Active Learning and Active Teaching

With regard to the epistemic motivation group of predictions, Hypothesis 13a predicted that epistemic motivation would accentuate the positive relationship between team psychological safety and the change in one's active learning. Results indicated that after accounting for the control variables, the cross-level interaction between team psychological safety and epistemic motivation was not significant (γ_{41} = -.28, n.s.). Thus, Hypothesis 13a was not supported. Next, Hypothesis 13b posited that epistemic motivation would accentuate the positive relationship between team psychological safety and the change in one's active teaching. After accounting for the control variables, the cross-level interaction between psychological safety and epistemic motivation was not significant (γ_{41} = -.30, n.s.), thus failing to support the hypothesis. Next, Hypothesis 13c stated that epistemic motivation would accentuate the positive relationship between team reflection and the change in one's active learning. Results indicated that that after accounting for the control variables, the cross-level interaction between team reflection and epistemic motivation was not significant (γ_{42} = -.03, n.s.), and therefore the prediction was not supported by the data. Finally, Hypothesis 13d predicted that epistemic motivation would accentuate the positive relationship between team reflection and the change in one's active teaching. After accounting for the control variables, the cross-level interaction between team reflection and epistemic motivation was not significant (γ_{42} = -.19, n.s.), contrary to the prediction. To summarize this group of results, Hypotheses 13a-13d were not supported by the data.

Turning now to the prosocial motivation group of predictions, Hypothesis 14a predicted that prosocial motivation would accentuate the positive relationship between team psychological safety and the change in one's active learning. Results indicated that after accounting for the

control variables, the cross-level interaction between team psychological safety and prosocial motivation was not significant (γ_{51} = -.10, n.s.). Thus, Hypothesis 14a failed to receive support. Next, Hypothesis 14b posited that prosocial motivation would accentuate the positive relationship between team psychological safety and the change in one's active teaching. After accounting for the controls, the cross-level interaction between team psychological safety and prosocial motivation was not significant (γ_{51} = -.16, n.s.). Thus, Hypothesis 14b was not supported by study data. Next, Hypothesis 14c proposed that prosocial motivation would accentuate the positive relationship between team reflection and the change in one's active learning. Results from the study indicated that after accounting for the controls, the cross-level interaction between team reflection and prosocial motivation was not significant (γ_{52} = -.01, n.s.), and thus the hypothesis did not receive support. Lastly, Hypothesis 14d posited that prosocial motivation would accentuate the positive relationship between team reflection and the change in one's active teaching. Analyses indicated that after accounting for the control variables, the cross-level interaction between team reflection and prosocial motivation was not significant (γ_{52} = -.13, n.s.). Therefore, the hypothesis was not supported. To summarize these predictions regarding prosocial motivation, Hypotheses 14a-14d were not supported by study data.

DISCUSSION

The objective of this research was to advance scientific knowledge of learning behavior within teams. To this end, I first argued that different forms of learning-oriented behavior exist at the individual level. In particular, extending previous theory (Argote, et al., 2001; Edmondson, 1999), I posited that active learning describes proactive efforts of team members to *acquire*

knowledge from others, whereas active teaching refers to proactive efforts to *share* knowledge with others. Next, I suggested that while both of these behaviors were expected to increase one's job satisfaction and decrease intentions to turnover, they would also exhibit disparate effects on task performance and social status. Specifically, active learning was expected to positively impact task performance while having negative effects on social status. Active teaching was predicted to have the opposite effects.

In addition to investigating these outcomes of active learning and active teaching, I was interested in studying the moderated influence of team context on each of these variables as well. In this vein, I first characterized team context by arguing that social information processing (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990) serves as the mechanism by which team psychological safety and team reflection positively influence active learning and active teaching. Further, to develop a more refined theoretical analysis of this social information processing mechanism, I suggested that the information processing motivation (De Dreu, et al., 2008; De Dreu, Weingart, et al., 2000; Kunda, 1990) of individuals would moderate this influence of team context. Specifically, I argued that both the epistemic motivation (e.g., need for cognition; Cacioppo & Petty, 1982) and prosocial motivation (e.g., team identification; Ashforth & Mael, 1989; Tajfel, 1978; Tajfel & Turner, 1979) of individuals would accentuate the positive effects of team psychological safety and team reflection on the engagement of active learning and active teaching.

To test these predictions, I conducted a quasi-experimental field study (Cook & Campbell, 1979) using a diverse sample of teams throughout a number of organizations. Below I provide a summary of the findings and a series of supplemental analyses to gain further insights.

Afterwards, I discuss the strengths and limitations of the study, followed by recommendations for future research and some concluding thoughts.

Summary of Findings

First, neither active learning nor active teaching had the anticipated main effects on any of the changes in team member outcomes. Specifically, they had no direct effects on a change in task performance, social status, job satisfaction, or turnover intentions. Further, the interactive effects of active learning and active teaching demonstrated no significant impact on a change in social status, job satisfaction, or turnover intentions. However, there was an interactive effect on a change in task performance. Specifically, active learning appears to be associated with an increase in task performance when active teaching is *high* rather than low. Thus, contrary to the prediction that active teaching would act as a neutralizer of the positive influence of active learning on task performance, it actually appears to have accentuated the relationship. Perhaps the most interesting contrast in this interaction (see Figure 9) is the difference between the largest and smallest increases in task performance ($t = 2.19$, $p < .05$). In particular, task performance increased the *most* to the extent that individuals engaged in both active learning and active teaching, and it increased the *least* to the extent that individuals engaged in active learning but not active teaching. From a performance appraisal perspective, leaders may have "rewarded", via higher increases in performance ratings, team members that managed to engage in high levels of both active learning and active teaching within the team. By contrast, this finding also suggests that leaders may have "punished", via lower increases in performance ratings, members who only engaged in active learning but little active teaching. Such individuals may be considered "black holes of knowledge" within the team whereby they absorb knowledge from their environment (teammates) without sharing much in return. From a group process

perspective, this finding may suggest that the act of acquiring and sharing knowledge among teammates (i.e., active learning and active teaching, respectively) may facilitate learning at the team level, which, in turn, promotes team performance. Thus, while the extant teams literature has demonstrated a link between team-level learning and team performance (Edmondson, et al., 2007), the current study provides some evidence for an individual-level antecedent process which may set this team-level relationship into motion. Later, I discuss recommendations for how future research can follow-up on this finding.

Next, I tested for the moderated influence of team context on active learning and active teaching. In particular, I examined two moderators at the individual level: epistemic motivation and prosocial motivation (De Dreu, et al., 2008; De Dreu, Weingart, et al., 2000). First, results indicated that epistemic motivation did not significantly moderate the effects of team psychological safety or team reflection on either outcome. I had expected that epistemically motivated individuals, vis-à-vis their deep, systematic information processing, would be especially impacted by social informational cues (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990) related to team context – and thus epistemic motivation was argued to accentuate the relationship between team context and their engagement of active learning and teaching. It could be the case that my operationalization of epistemic motivation was not ideal for this context, which may explain this lack of support for my hypotheses. Alternatively, the null results may be due to the low correspondence between team context (team psychological safety and team reflection) and the engagement of active learning and teaching. Thus, perhaps epistemic motivation did not play a moderating role because there was no strong main effect to be moderated. I follow up on these possibilities below in the supplemental analyses section.

Second, in addition to these results concerning epistemic motivation, analyses also indicated that prosocial motivation did not significantly moderate the effects of team psychological safety or team reflection on either outcome. I had expected that prosocially motivated individuals, vis-à-vis their collective-oriented information processing, would be especially impacted by social informational cues (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990) related to team context – and thus prosocial motivation was argued to accentuate the relationship between team context and the engagement of active learning and teaching. Analogous to that of epistemic motivation, it could be the case that my operationalization of prosocial motivation was not idea for this context, which may explain this lack of hypothetical support. Instead, it may be due to the low correspondence between team context and the engagement of active learning and teaching. Thus, it could be that prosocial motivation did not have a moderating effect because there was no strong main effect to be moderated. I follow up on these possibilities later.

Overall, the results did not support my predictions regarding either the outcomes or antecedents of active learning and active teaching. I next performed a series of supplemental analyses with the objective of gaining further insight into my findings.

Supplemental Analyses

I performed five supplemental analyses. The objective of the first two is to provide alternative means of testing both the outcomes (Hypotheses 1-12) and antecedents (Hypotheses 13 and 14) of active learning and active teaching. Next, I change the manner in which predictors are treated in HLM analyses by considering their relative, rather than absolute, effects on outcomes. Afterwards, I consider the impact of conducting a series of CFAs in order to modify

the factor structure of the active learning and active teaching scales. In my final supplemental analysis, I examine more closely the impact of the team reflection intervention.

First, with regard to the influence of active learning and active teaching on changes in task performance, social status, job satisfaction, and turnover intentions, it is possible that the team reflection intervention may have influenced these outcomes. In other words, the intervention may have been driving a lot of the variance between time 1 and time 2, thus not leaving much variance to reveal the effects of active learning and active teaching. Thus, I re-tested my hypotheses taking into account team reflection as a control variable. As shown in Table 7, this alternative analysis did not differ substantively from the original. Moreover, a plot of the interactive effects of active learning and active teaching on a change in task performance (Hypothesis 9; $\gamma_{60} = .12$, $p < .05$) revealed the same pattern as before (see Figure 10).

Predictor	Task Perf$_{t2}$		Social Status$_{t2}$		Job Sat$_{t2}$		Turnover Int$_{t2}$	
	γ	*SE*	*γ*	*SE*	*γ*	*SE*	*γ*	*SE*
Intercept (γ_{00})	.09	.11	.18	.17	.05	.10	.12	.13
Team Reflection (γ_{01})	.14	.13	-.15	.18	.17	.11	-.02	.10
Team Size (γ_{02})	-.01	.03	.02	.03	<.01	.02	-.01	.03
Age (γ_{10})	.01*	<.01	<.01	<.01	-.01	.01	-.01	.01
Gender (γ_{20})	-.16*	.09	-.19*	.10	-.18*	.09	-.12	.14
Task Performance$_{t1}$(γ_{30})	.75*	.13						
Hypothesis 1 :								
Active Learning$_{t1}$ (γ_{40})	<.01	.05						
Hypothesis 5 :								
Active Teaching$_{t1}$ (γ_{50})	.11	.09						
Hypothesis 9 :								
AL$_{t1}$ x AT$_{t1}$ (γ_{60})	.12*	.06						
Social Status$_{t1}$(γ_{30})			.61*	.08				
Hypothesis 2 :								
Active Learning$_{t1}$ (γ_{40})			.06	.08				
Hypothesis 6 :								
Active Teaching$_{t1}$ (γ_{50})			.07	.12				
Hypothesis 10 :								
AL$_{t1}$ x AT$_{t1}$ (γ_{60})			-.07	.12				
Job Satisfaction$_{t1}$(γ_{30})					.65*	.11		
Hypothesis 3 :								
Active Learning$_{t1}$ (γ_{40})					.03	.14		
Hypothesis 7 :								
Active Teaching$_{t1}$ (γ_{50})					.09	.12		
Hypothesis 11 :								
AL$_{t1}$ x AT$_{t1}$ (γ_{60})					.09	.17		
Turnover Intentions$_{t1}$(γ_{30})							.70*	.06
Hypothesis 4 :								
Active Learning$_{t1}$ (γ_{40})							-.15	.14
Hypothesis 8 :								
Active Teaching$_{t1}$ (γ_{50})							.09	.11
Hypothesis 12 :								
AL$_{t1}$ x AT$_{t1}$ (γ_{60})							-.10	.13
N (Level 1)	128		128		124		124	
N (Level 2)	26		26		27		27	

Notes:

* p < .05, one-tailed. Gender coded 1 for male, 0 female

Team Reflection coded 1 for team participation in training, 0 for control group

SE = Standard Error. AL = Active Learning. AT = Active Teaching

Table 7. Effects of Active Learning and Active Teaching on Changes in Team Member Outcomes

(Now Controlling for Team Reflection)

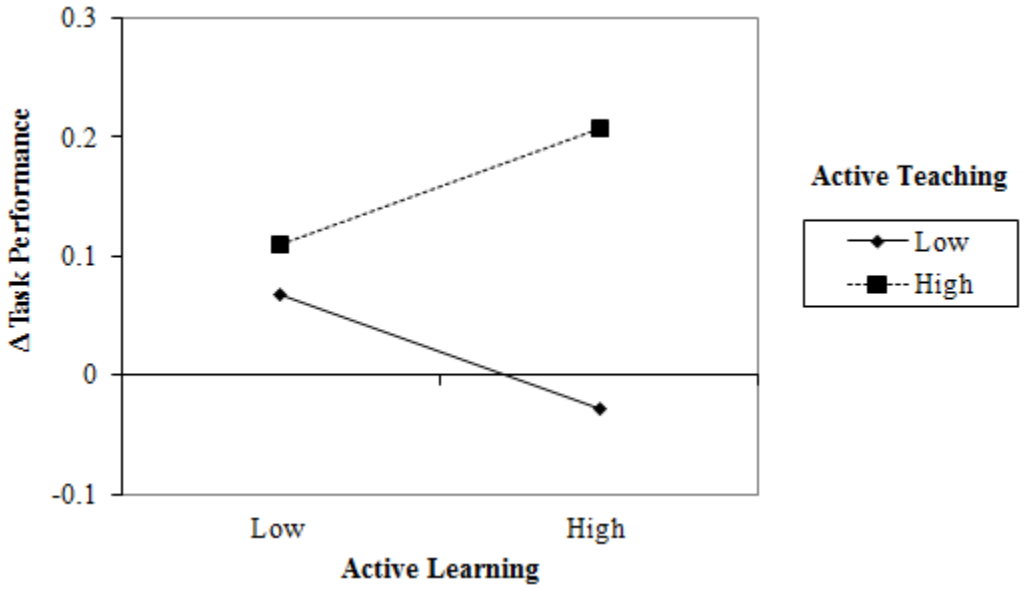

Figure 10. Interactive Effects of Active Learning and Active Teaching on a Change in Task Performance (Now Controlling for Team Reflection)

The next supplemental analysis I conducted involved using alternative operationalizations of epistemic and prosocial motivation in testing for the moderated influence of team context on active learning and active teaching. It could be the case that the lack of support regarding this part of my model (Hypotheses 13 and 14) was due to the rather narrow representatives of epistemic and prosocial motivation that I tested, namely need for cognition (Cacioppo & Petty, 1982) and team identification (Ashforth & Mael, 1989; Tajfel, 1978; Tajfel & Turner, 1979). Fortunately, my surveys for this study included more generalized representations of these constructs as well: conscientiousness and agreeableness (Costa & McCrae, 1992; Saucier, 1994). Please refer to Table 8 for the means, standard deviations, internal consistency reliabilities, and intercorrelations for these variables along with other variables introduced throughout the initial and supplemental analyses.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	43.32	10.57	--													
2. Gender	.70	.46	-.17*	--												
3. Epistemic Motivation (NFC)	3.56	.56	-.22*	.16	(.88)											
4. Prosocial Motivation (Team Id)	3.93	.65	-.10	-.12	.10	(.78)										
5. Active Learning$_{t1}$	3.73	.63	-.08	-.12	.27*	.43*	(.83)									
6. Active Learning$_{t2}$	3.77	.55	-.09	-.11	.17*	.14	.51*	(.80)								
7. Active Teaching$_{t1}$	3.58	.65	.00	-.03	.24*	.28*	.51*	.40*	(.84)							
8. Active Teaching$_{t2}$	3.65	.66	-.05	-.03	.11	.16	.32*	.68*	.55*	(.85)						
9. Task Performance$_{t1}$	4.35	.71	.03	-.29*	.00	.04	.10	.05	.12	.13	(.97)					
10. Task Performance$_{t2}$	4.22	.89	.16	-.31*	-.05	.08	.10	.14	.10	.21*	.63*	(.97)				
11. Social Status$_{t1}$	3.96	.91	.09	-.14	-.08	.12	.13	.08	.29*	.26*	.50*	.43*	(.92)			
12. Social Status$_{t2}$	4.03	.95	.07	-.24*	-.01	.22*	.17*	.14	.17*	.31*	.52*	.81*	.59*	(.95)		
13. Job Satisfaction$_{t1}$	4.15	.73	.12	.00	.11	.33*	.40*	.20*	.30*	.23*	.16	.17	.21*	.24*	(.93)	
14. Job Satisfaction$_{t2}$	4.07	.85	-.02	-.06	.19*	.25*	.23*	.24*	.18*	.19*	.22*	.24*	.19*	.18*	.49*	(.95)
15. Turnover Intentions$_{t1}$	2.07	1.01	-.05	-.05	.03	-.24*	-.19*	-.03	-.07	-.08	-.19*	-.23*	-.18*	-.23*	-.59*	-.37*
16. Turnover Intentions$_{t2}$	2.01	1.04	-.09	-.04	-.06	-.17	-.23*	-.20*	-.10	-.20*	-.19*	-.21*	-.13	-.17	-.44*	-.58*
17. Epistemic Motivation (Consc)	4.24	.60	.09	-.18*	.07	.05	.05	-.09	.05	.02	.17*	.09	.06	.13	.12	.05
18. Prosocial Motivation (Agree)	4.24	.59	-.05	-.14	.10	.17*	.12	.12	.08	.21*	-.02	-.06	.10	-.02	.22*	.23*
19. Active Learning (condensed)$_{t1}$	3.21	.94	.00	-.11	.19*	.32*	.90*	.51*	.40*	.27*	.09	.14	.14	.19*	.31*	.13
20. Active Learning (condensed)$_{t2}$	3.26	.84	-.05	.03	.20*	.08	.48*	.85*	.30*	.46*	.02	.13	.01	.09	.18*	.14
21. Active Teaching (condensed)$_{t1}$	3.19	.82	-.02	.07	.24*	.25*	.51*	.38*	.89*	.46*	.07	.08	.22*	.14	.26*	.12
22. Active Teaching (condensed)$_{t2}$	3.27	.86	-.05	.04	.11	.16	.32*	.64*	.54*	.92*	.06	.20*	.23*	.29*	.20*	.13
23. Psychological Safety$_{t1}$	3.71	.84	.04	.06	.01	.12	.24*	-.01	.28*	.20*	.19*	.26*	.37*	.27*	.37*	.24*
24. Psychological Safety$_{t2}$	3.67	.79	.00	.06	.03	.14	.13	.14	.18*	.28*	.17	.24*	.19*	.19*	.31*	.42*
25. Relationship Conflict$_{t1}$	2.29	.82	-.12	-.02	.22*	-.04	-.15	.16	-.20*	.01	-.02	.01	-.02	-.01	-.21*	-.12
26. Relationship Conflict$_{t2}$	2.40	.80	-.03	-.24*	.11	.02	-.04	.17	-.08	.01	.12	.07	-.05	.10	-.15	-.33*

Notes:

* $p < .05$, two-tailed. N = 106-158. Gender coded 1 for male, 0 female. M = Mean, SD = Standard Deviation, NFC = Need for Cognition Team Id = Team Identification, Internal consistency reliability (α) is provided on the diagonal for the relevant scales

Table 8. Descriptive Statistics and Relationships among Level 1 Variables (Including Variables in Supplemental Analyses)

Table 8 (cont'd)

Variable	15	16	17	18	19	20	21	22	23	24	25	26
1. Age												
2. Gender												
3. Epistemic Motivation (NFC)												
4. Prosocial Motivation (Team Id)												
5. Active Learning$_{t1}$												
6. Active Learning$_{t2}$												
7. Active Teaching$_{t1}$												
8. Active Teaching$_{t2}$												
9. Task Performance$_{t1}$												
10. Task Performance$_{t2}$												
11. Social Status$_{t1}$												
12. Social Status$_{t2}$												
13. Job Satisfaction$_{t1}$												
14. Job Satisfaction$_{t2}$												
15. Turnover Intentions$_{t1}$	(.82)											
16. Turnover Intentions$_{t2}$	.66*	(.84)										
17. Epistemic Motivation (Consc)	-.12	.01	(.85)									
18. Prosocial Motivation (Agree)	-.11	-.13	.33*	(.85)								
19. Active Learning (condensed)$_{t1}$	-.17*	-.18*	-.04	.04	(.88)							
20. Active Learning (condensed)$_{t2}$	-.07	-.19*	-.19*	-.01	.55*	(.89)						
21. Active Teaching (condensed)$_{t1}$	-.12	-.08	.04	.02	.47*	.35*	(.78)					
22. Active Teaching (condensed)$_{t2}$	-.08	-.12	-.04	.18*	.30*	.53*	.51*	(.81)				
23. Psychological Safety$_{t1}$	-.33*	-.37*	.11	.11	.12	-.03	.16*	.14	(.87)			
24. Psychological Safety$_{t2}$	-.25*	-.41*	-.05	.16	.04	.02	.09	.16	.64*	(.83)		
25. Relationship Conflict$_{t1}$	.14	.17	-.03	.08	-.08	.18	-.07	.06	-.62*	-.40*	(.94)	
26. Relationship Conflict$_{t2}$	.12	.34*	-.02	-.05	.01	.22*	-.03	.10	-.46*	-.51*	.62*	(.93)

To briefly illustrate how these operationalizations represent their higher-order counterparts, first consider that one of the facets of conscientiousness is deliberation – the tendency to think very carefully before taking action. Reflecting this notion, conscientiousness has been found to relate to the extent to which individuals engage in an elaborate and deep understanding of learning material (Busato, Prins, Elshout, & Hamaker, 1999), congruent with the epistemic motivation construct. Second, individuals characterized as high in agreeableness tend to be other-oriented and concerned with social harmony. A key facet of agreeableness is compliance – the tendency to be cooperative, courteous, and concerned with the well-being of one's social group rather than personal interests. Thus, agreeableness is a prime indicator of prosocial motivation (De Dreu, et al., 2008).

As shown in Table 9, the results of analyses using these alternative operationalizations were quite different than before. For instance, after accounting for the control variables, the cross-level interaction between team reflection and epistemic motivation (conscientiousness) was significant with respect to the changes in both dependent variables: active learning (γ_{42} = -.22, $p < .05$) and active teaching (γ_{42} = -.21, $p < .05$). These interactions are plotted, respectively, in Figures 11 and 12. Recall my predictions that epistemic motivation would accentuate the positive effect of team reflection on both active learning (Hypothesis 13c) and active teaching (Hypothesis 13d). On the contrary, the interaction plots seem to indicate that *low* levels of epistemic motivation actually accentuated the positive effect of team reflection on each outcome. Interestingly, individuals whose teams participated in the team reflection training engaged in more active learning and active teaching to the extent that they were *not* epistemically motivated ($t = -2.07$, $p < .05$ and $t = -3.04$, $p < .05$, respectively). One might suggest that this interaction effect is due to epistemically motivated individuals already engaging in high levels of active

learning and active teaching, even before the training – and thus there may be relatively little room for improvement. However, this explanation does not seem to be the case, as conscientiousness was not correlated with initial levels of active learning ($r = .05$, n.s.) or active teaching ($r = .05$, n.s.).

Predictor	Active Learning$_{t2}$		Active Teaching$_{t2}$	
	γ	*SE*	*γ*	*SE*
Intercept (γ_{00})	.01	.07	-.06	.11
Team Size (γ_{01})	-.01	.03	-.06	.04
Team Psychological Safety (γ_{02})	-.07	.12	-.02	.17
Team Reflection (γ_{03})	.05	.08	.06	.11
Age (γ_{10})	<.01	<.01	<.01	<.01
Gender (γ_{20})	-.07	.08	.04	.11
Active Learning$_{t1}$ (γ_{30})	.48*	.09		
Epistemic Motivation (γ_{40})	-.06	.07		
Hypothesis 13a : Team Psychological Safety (γ_{41})	-.17	.11		
Hypothesis 13c : Team Reflection (γ_{42})	-.22*	.11		
Prosocial Motivation (γ_{50})	<.01	.09		
Hypothesis 14a : Team Psychological Safety (γ_{51})	.27*	.11		
Hypothesis 14c : Team Reflection (γ_{52})	.20	.15		
Active Teaching$_{t1}$ (γ_{30})			.51*	.06
Epistemic Motivation (γ_{40})			-.04	.06
Hypothesis 13b : Team Psychological Safety (γ_{41})			-.12	.13
Hypothesis 13d : Team Reflection (γ_{42})			-.21*	.10
Prosocial Motivation (γ_{50})			.08	.13
Hypothesis 14b : Team Psychological Safety (γ_{51})			-.02	.21
Hypothesis 14d : Team Reflection (γ_{52})			.15	.22
N (Level 1)	127		127	
N (Level 2)	27		27	

Notes:
* p < .05, one-tailed. Gender coded 1 for male, 0 female
Team Reflection coded 1 for team participation in training, 0 for control group
SE = Standard Error

Table 9. Moderated Influence of Team Context (Now Using Conscientiousness and Agreeableness Operationalizations) on Changes in Active Learning and Active Teaching

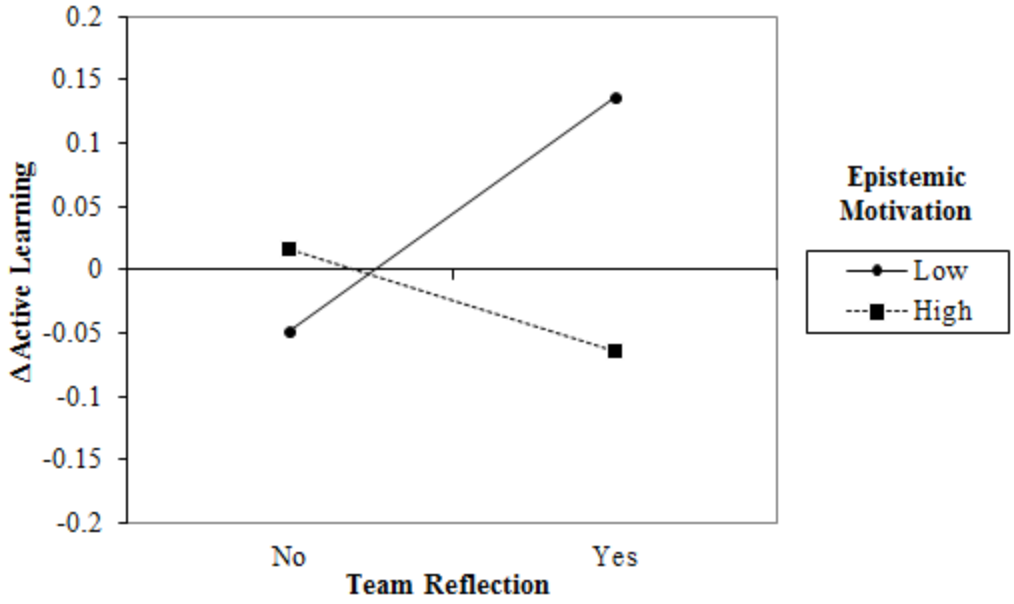

Figure 11. Interactive Effects of Team Reflection and Epistemic Motivation (Now Operationalized as Conscientiousness) on a Change in Active Learning

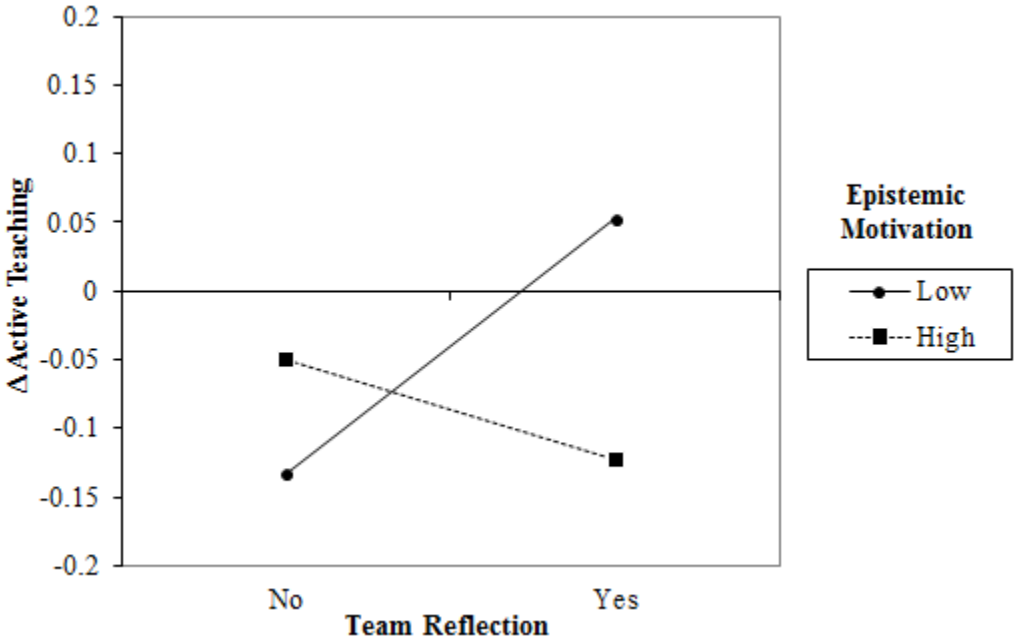

Figure 12. Interactive Effects of Team Reflection and Epistemic Motivation (Now Operationalized as Conscientiousness) on a Change in Active Teaching

An alternative explanation relates to the nature of conscientiousness. Most research on this personality trait has focused on its facilitating effects on positive work outcomes (e.g., Barrick & Mount, 1991); however, there is some research highlighting its downsides as well (Tett, 1998). For example, LePine, Colquitt, and Erez (2000) found that when faced with a change in one's decision-making context, individuals with low levels of conscientiousness actually adapted better than those high in this trait. In supplemental analyses, they determined that this was due to the dependability-related facets of conscientiousness (i.e., order, dutifulness, and deliberation). Thus, a potential downside of conscientiousness is that it may promote rigidity and inflexibility. Applying this knowledge to the current study, it could be the case that the team training intervention was less effective for highly conscientious individuals because they were, in a sense, resolute in their adherence to extant levels of active learning and teaching; and consequently, they may have been somewhat resistant to the effects of the intervention.

Another finding emerged after re-analyzing the data using the alternative operationalizations of epistemic and prosocial motivation. As shown in Table 9, after accounting for the control variables, the cross-level interaction between team psychological safety and prosocial motivation (agreeableness) was significant with respect to the change in active learning ($\gamma_{51} = .27$, $p < .05$). Thus, prosocial motivation affected the manner in which team psychological safety impacted a change in active learning. A plot of this interaction (Figure 13) suggests that high levels of prosocial motivation did, in fact, seem to accentuate the positive effects of team psychological safety on a change in active learning, consistent with Hypothesis 14a; however, the slope for this relationship was not statistically significant ($t = .72$, n.s.).

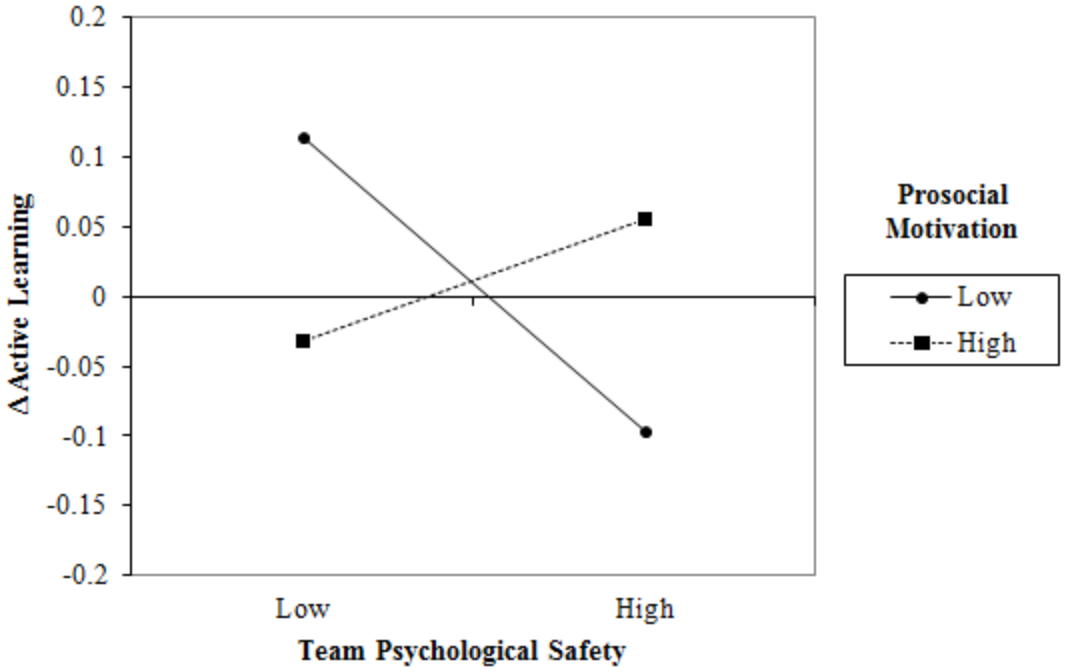

Figure 13. Interactive Effects of Team Psychological Safety and Prosocial Motivation (Now Operationalized as Agreeableness) on a Change in Active Learning

In sum, with regard to how my findings differed depending on how epistemic and prosocial motivation are operationalized, an important conclusion is emphasized: The manner in which lower-level constructs (e.g., need for cognition and conscientiousness) represent their higher-order counterparts (e.g., epistemic motivation) is not straightforward. In this study, I found the more generalized representations (e.g., conscientiousness) to explain more variance in outcomes than those that were narrower in scope (e.g., need for cognition). This finding may be useful as future research is conducted on motivated information processing.

In my next supplemental analysis, I changed the manner in which predictors are treated in HLM analyses by considering their relative, rather than absolute, effects on outcomes. My initial tests of hypotheses utilized grand-mean centering of predictors; however, this does not consider within-team differences in terms of such predictors. For instance, in determining the impact of

active learning on team member outcomes, any norms (e.g., means) in active learning within each team are not taken into account. In this supplemental analysis, I instead utilized group-mean centering of predictors in order to take such within-team differences into account and thereby examine the relative impact on outcomes.

Table 10 provides the results of this new analysis in terms of the outcomes of active learning and active teaching. First, notice that after accounting for the control variables, the engagement of active teaching was related to an *increase* in one's task performance ($\gamma_{50} = .15$, $p < .05$). The opposite prediction was made (Hypothesis 5) based on a resource allocation framework (Becker, 1965; Hockey, 1997); namely, the more time team members spend on sharing knowledge with others (i.e. active teaching), the less time they likely have to spend on their own taskwork, and hence performance was expected to suffer. As this logic was not supported by the data, it may be the case that the engagement of active teaching simply did not substantially hinder one's ability to perform his/her job. However, this explanation alone would suggest no relationship between active teaching and the change in one's task performance, and yet the relationship is positive. As another explanation, perhaps sharing knowledge with others was reciprocated in the form of favors and helping behavior more generally, to the extent that one's own task performance benefited (cf. Flynn, 2003).

Predictor	Task $Perf_{t2}$		Social $Status_{t2}$		Job Sat_{t2}		Turnover Int_{t2}	
	γ	*SE*	*γ*	*SE*	*γ*	*SE*	*γ*	*SE*
Intercept (γ_{00})	-.01	.02	<.01	.02	.01	.03	-.03	.04
Team Size (γ_{01})	.01	.01	.02*	.01	-.01	.01	.01	.01
Age (γ_{10})	.01*	<.01	<.01	<.01	-.01	.01	-.01	.01
Gender (γ_{20})	-.11	.08	-.15	.09	-.33*	.12	-.35	.16
Task $Performance_{t1}$(γ_{30})	.75*	.12						
Hypothesis 1 :								
Active $Learning_{t1}$ (γ_{40})	-.04	.04						
Hypothesis 5 :								
Active $Teaching_{t1}$ (γ_{50})	.15*	.08						
Hypothesis 9 :								
AL_{t1} x AT_{t1} (γ_{60})	.14*	.05						
Social $Status_{t1}$(γ_{30})			.57*	.08				
Hypothesis 2 :								
Active $Learning_{t1}$ (γ_{40})			.08	.09				
Hypothesis 6 :								
Active $Teaching_{t1}$ (γ_{50})			.08	.12				
Hypothesis 10 :								
AL_{t1} x AT_{t1} (γ_{60})			-.07	.10				
Job $Satisfaction_{t1}$(γ_{30})					.53*	.14		
Hypothesis 3 :								
Active $Learning_{t1}$ (γ_{40})					.06	.24		
Hypothesis 7 :								
Active $Teaching_{t1}$ (γ_{50})					.32*	.10		
Hypothesis 11 :								
AL_{t1} x AT_{t1} (γ_{60})					.01	.27		
Turnover $Intentions_{t1}$(γ_{30})							.72*	.07
Hypothesis 4 :								
Active $Learning_{t1}$ (γ_{40})							-.17	.13
Hypothesis 8 :								
Active $Teaching_{t1}$ (γ_{50})							.13	.12
Hypothesis 12 :								
AL_{t1} x AT_{t1} (γ_{60})							-.16	.21
N (Level 1)	128		128		124		124	
N (Level 2)	26		26		27		27	

Notes:
* p < .05, one-tailed. Gender coded 1 for male, 0 female
SE = Standard Error, AL = Active Learning, AT = Active Teaching

Table 10. Effects of Active Learning and Active Teaching on Changes in Team Member Outcomes (Now Using Group-Mean Centering)

Second, notice that after accounting for the controls, the engagement of active teaching was also related to an increase in job satisfaction, consistent with Hypothesis 7 (γ_{50} = .32, p < .05). Thus, it seems as if one's job satisfaction is, in fact, impacted by active teaching, but only to the extent that one engages in higher levels of active teaching *as compared to others within the team*. Notice that the engagement of active learning was *not* significantly related to an increase in this outcome (γ_{40} = .06, n.s.) and thus Hypothesis 3 remains unsupported. Finally, after accounting for the control variables, there was a significant interaction between active learning and active teaching on a change in task performance (γ_{60} = .14, p < .05), and in the same pattern as in the original analysis.

Table 11 provides the results of this supplemental analysis in terms of the antecedents of active learning and active teaching. Note that the original operationalizations of epistemic and prosocial motivation are used in this analysis (i.e., need for cognition and team identification, respectively). In contrast to the initial analysis, after accounting for the control variables, the cross-level interaction between prosocial motivation and team psychological safety was significant with respect to the change in active teaching (γ_{51} = -.34, p < .05). Also, after accounting for the controls, the cross-level interaction between prosocial motivation and team reflection was also significant with respect to the same outcome (γ_{52} = -.23, p < .05).

Predictor	Active Learning$_{t2}$		Active Teaching$_{t2}$	
	γ	*SE*	*γ*	*SE*
Intercept (γ_{00})	<.01	.01	.02	.01
Team Size (γ_{01})	-.01	.01	-.02*	.01
Team Psychological Safety (γ_{02})	<.01	.03	-.07*	.04
Team Reflection (γ_{03})	-.01	.02	<.01	.02
Age (γ_{10})	<.01	<.01	<.01	.01
Gender (γ_{20})	-.07	.11	-.01	.13
Active Learning$_{t1}$ (γ_{30})	.55*	.08		
Epistemic Motivation (γ_{40})	.20*	.10		
Hypothesis 13a : Team Psychological Safety (γ_{41})	.09	.22		
Hypothesis 13c : Team Reflection (γ_{42})	-.28	.18		
Prosocial Motivation (γ_{50})	-.08	.12		
Hypothesis 14a : Team Psychological Safety (γ_{51})	-.10	.14		
Hypothesis 14c : Team Reflection (γ_{52})	-.18	.14		
Active Teaching$_{t1}$ (γ_{30})			.53*	.06
Epistemic Motivation (γ_{40})			-.01	.10
Hypothesis 13b : Team Psychological Safety (γ_{41})			-.15	.19
Hypothesis 13d : Team Reflection (γ_{42})			-.18	.18
Prosocial Motivation (γ_{50})			.06	.08
Hypothesis 14b : Team Psychological Safety (γ_{51})			-.34*	.11
Hypothesis 14d : Team Reflection (γ_{52})			-.23*	.10
N (Level 1)	127		127	
N (Level 2)	27		27	

Notes:

* p < .05, one-tailed. Gender coded 1 for male, 0 female

Team Reflection coded 1 for team participation in training, 0 for control group

SE = Standard Error

Table 11. Moderated Influence of Team Context on Changes in Active Learning and Active Teaching (Now Using Group-Mean Centering)

As shown in Figures 14 and 15, team psychological safety and team reflection appear to be positively associated with a change in active teaching to the extent that individuals are *not* prosocially motivated, as compared to others within the team. Recall that based on motivated information processing theory (De Dreu, et al., 2008; De Dreu, Weingart, et al., 2000; Kunda, 1990), I had predicted (Hypotheses 14b and 14d) an accentuating role of prosocial motivation, counter to this finding. Although this challenges the motivated information processing perspective of the study's model, I believe it represents a very interesting finding.

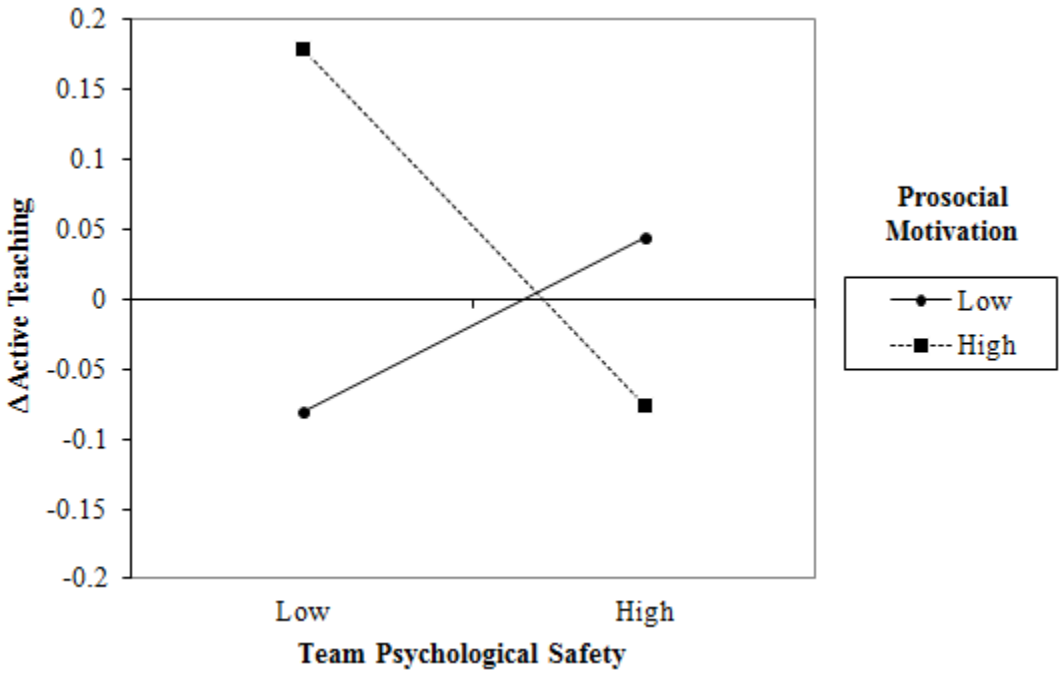

Figure 14. Interactive Effects of Team Psychological Safety and Prosocial Motivation on a Change in Active Teaching (Now Using Group-Mean Centering)

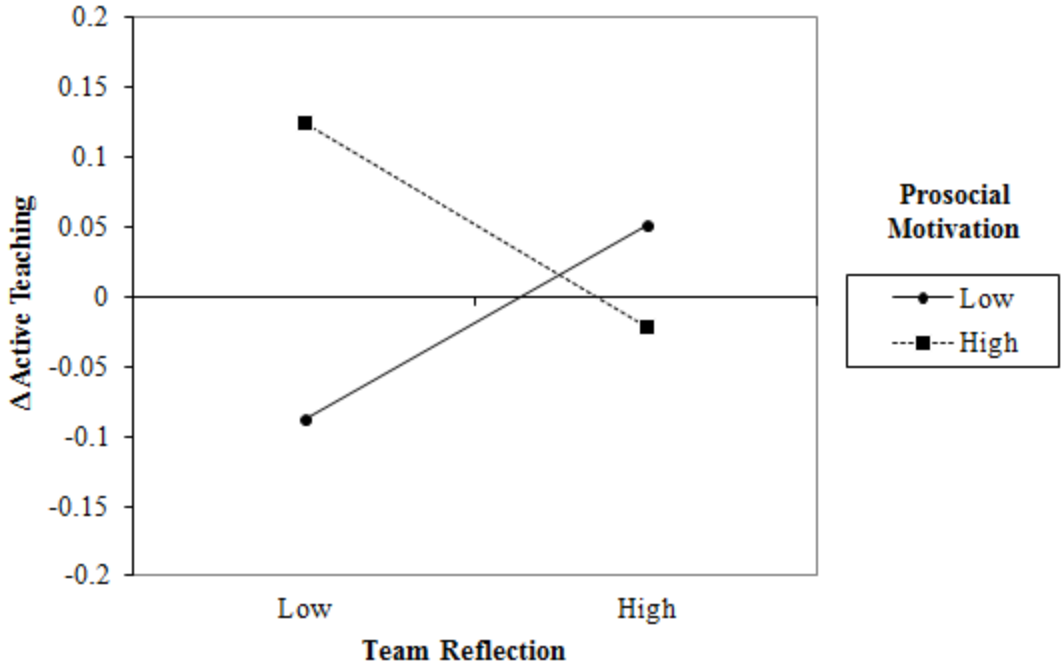

Figure 15. Interactive Effects of Team Reflection and Prosocial Motivation on a Change in Active Teaching (Now Using Group-Mean Centering)

Regarding my next supplemental analysis, recall that the CFA (see Table 1 or the "7-Item Scales" section of Table 12) of the active learning and active teaching items demonstrated that the two-factor model fit the data better than the one-factor model; and thus I proceeded with utilizing the scales throughout the study. However, the overall fit of the two-factor model was not ideal. Below, I consider the impact of modifying the factor structure of the active learning and teaching scales in order to achieve a good fitting model among the items used to represent these scales.

Model	χ^2 (df)	CFI	GFI	NFI	RMSEA
7-Item Scales					
Two-factor	323.8 (76)	.800	.768	.757	.126
One-factor	483.6 (77)	.672	.707	.637	.160
6-Item Scales					
Two-factor	205.2 (53)	.859	.828	.821	.118
One-factor	372.9 (54)	.706	.726	.675	.170
5-Item Scales					
Two-factor	139.1 (34)	.882	.862	.852	.123
One-factor	301.6 (35)	.702	.719	.679	.193
4-Item Scales					
Two-factor	53.9 (19)	.952	.937	.929	.095
One-factor	211.0 (20)	.740	.745	.723	.216
3-Item Scales					
Two-factor	13.1 (8)	.992	.979	.979	.056
One-factor	150.3 (9)	.765	.781	.757	.277

Notes:
N = 206
χ^2 = Chi-square, df = degrees of freedom, CFI = Comparative Fit Index
GFI = Goodness of Fit Index, NFI = Normed Fit Index
RMSEA = Root Mean Square Error of Approximation

Table 12. Additional Confirmatory Factor Analyses for Active Learning and Active Teaching Items

Among the full set of items, those with the lowest factor loadings for both the two- and one-factor models were "I ask teammates for help if something comes up that I don't know how to handle" (active learning) and "Teammates ask me for help if something comes up that they don't know how to handle" (active teaching). As shown in Table 12 ("6-Item Scales" section), the overall fit for the two-factor model appeared to improve with the removal of these items (χ^2

= 205.2, df = 53; CFI = .859; GFI = .828; NFI = .821; RMSEA = .118). Note that the fit indices for the one-factor model are provided in the table for this and subsequent CFAs for reference.

Despite this improvement, the overall model fit remained unsatisfactory; and thus I proceeded with removing additional items. From this subset of items, the one with the lowest loading was "I consider the feedback provided to me by teammates" (active learning). I removed this item as well as its corresponding active teaching item ("Teammates consider the feedback I provide to them"). As displayed in Table 12 ("5-Item Scales" section), the model fit appeared to generally improve (χ^2 = 139.1, df = 34; CFI = .882; GFI = .862; NFI = .852; RMSEA = .123).

Again, however, the overall fit remained unsatisfactory. In this reduced model, the items with the lowest loadings were the following: "I sometimes stop my work to consider information held by teammates" (active learning) and "I sometimes stop my work to provide information to teammates" (active teaching). The overall model fit appeared to improve with the removal of these items (see Table 12, "4-Item Scales" section: χ^2 = 53.9, df = 19; CFI = .952; GFI = .937; NFI = .929; RMSEA = .095).

Although nearly all of the fit indices suggested a good-fitting model in this reduced set of items, the RMSEA value remained above the .06 threshold recommended by Hu and Bentler (1999). As a result, I removed the following items having the lowest loadings: "I stay up-to-date with information and ideas from teammates" (active learning) and "vs. I keep teammates up-to-date with information and ideas" (active teaching). As shown in Table 12 ("3-Item Scales" section), the overall model fit the data well (χ^2 = 13.1, df = 8; CFI = .992; GFI = .979; NFI = .979; RMSEA = .056). Therefore, three-item scales were used in the re-analysis of hypotheses tests below.

Before proceeding, I should note that there is sometimes reason for concern when researchers significantly reduce the size of a given scale. While a condensed scale can be useful in achieving a more parsimonious measure with a sound factor structure, it also has the possibility of fundamentally changing the content of the scale. Despite this general concern, I do not believe it occurred for the above scale reductions. A careful examination of the resulting scales reveals the preservation of core elements of active learning and active teaching. For instance, "I ask teammates for feedback on my performance (active learning) and "I provide teammates with feedback on their performance" tap into the feedback element of learning behavior (Edmondson, 1999) and in how it is treated in this study, both feedback-*seeking* for active learning and feedback-*giving* for active teaching. Next, the items "I ask teammates to review my own progress and performance" (active learning) and "I actively review the progress and performance of teammates" (active teaching) tap into the reflection element of learning behavior (Edmondson, 1999) and in this study, social reflection – whether it is asking teammates to review one's own past progress and performance (active learning) or for a given individual to review the past progress and performance of others (active teaching). The final set of items retained is "I regularly take time to ask teammates how I can improve my work performance" (active learning) and "I regularly take time to figure out ways to improve the work performance of teammates" (active teaching) which tap into the experimentation element of learning behavior (Edmondson, 1999) and in this study, social experimentation – both asking teammates for their perspective of how one can improve (active learning) and efforts on behalf of an individual to figure out ways teammates can improve (active teaching). Overall, the resulting 3-item active learning and active teaching scales are not only parsimonious, but they also retain the core elements of these constructs.

Please refer to Table 13 for the effects of active learning and active teaching after using these condensed versions of the scales. Three key differences emerged in this new analysis. First, notice that after accounting for the control variables, the engagement of active learning was related to an *increase* in one's social status ($\gamma_{40} = .09$, $p < .05$). I had predicted the opposite (Hypothesis 2) due to the supposition that seeking knowledge from others would likely lead to a loss of social status via increased dependence (e.g., Emerson, 1962; Lee, 1997) and perceived inadequacy from the perspective of one's peers (e.g., Ashford & Cummings, 1983; Morrison, 1993). It may be the case that the opposite actually occurs; namely, seeking knowledge from others implies deference to them, and hence they reciprocate in the form of admiration and respect. In essence, active learning may be a way of building one's status via social exchange (Blau, 1964; Homans, 1958). Alternatively, perhaps the relationship between active learning and social status is curvilinear over time such that although the relationship may be positive in the short-term, over time, consistently seeking knowledge from teammates may eventually be detrimental to social status for the reasons I identified in my hypothesis development. To expand beyond this dissertation, I am currently collecting data from a third wave of surveys which is distributed after the teams in the control group participate in the training intervention. Thus, after this final wave of data is collected, I may be able to follow-up on this finding to detect differences in the relationship over time.

Predictor	Task Perf$_{t2}$		Social Status$_{t2}$		Job Sat$_{t2}$		Turnover Int$_{t2}$	
	γ	*SE*	γ	*SE*	γ	*SE*	γ	*SE*
Intercept (γ_{00})	.18*	.08	.10	.16	.09	.06	.08	.16
Team Size (γ_{01})	<.01	.03	-.01	.03	<.01	.03	-.06*	.03
Age (γ_{10})	.01*	<.01	-.01*	<.01	-.01	.01	-.01	.01
Gender (γ_{20})	-.22*	.09	-.22	.13	-.17*	.08	<.01	.15
Task Performance$_{t1}$(γ_{30})	.78*	.13						
Hypothesis 1 : Active Learning$_{t1}$ (γ_{40})	-.05	.04						
Hypothesis 5 : Active Teaching$_{t1}$ (γ_{50})	.19*	.09						
Hypothesis 9 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})	.09	.06						
Social Status$_{t1}$(γ_{30})			.62*	.08				
Hypothesis 2 : Active Learning$_{t1}$ (γ_{40})			.09*	.05				
Hypothesis 6 : Active Teaching$_{t1}$ (γ_{50})			<.01	.09				
Hypothesis 10 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})			-.01	.06				
Job Satisfaction$_{t1}$(γ_{30})					.64*	.10		
Hypothesis 3 : Active Learning$_{t1}$ (γ_{40})					-.03	.09		
Hypothesis 7 : Active Teaching$_{t1}$ (γ_{50})					.05	.08		
Hypothesis 11 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})					.02	.09		
Turnover Intentions$_{t1}$(γ_{30})							.61*	.04
Hypothesis 4 : Active Learning$_{t1}$ (γ_{40})							-.23	.16
Hypothesis 8 : Active Teaching$_{t1}$ (γ_{50})							.04	.15
Hypothesis 12 : AL$_{t1}$ x AT$_{t1}$ (γ_{60})							.15*	.08
N (Level 1)	128		128		124		124	
N (Level 2)	26		26		27		27	

Notes:

* p < .05, one-tailed. Gender coded 1 for male, 0 female

SE = Standard Error, AL = Active Learning, AT = Active Teaching

Table 13. Effects of Active Learning and Active Teaching (Now Using Condensed Versions of Scales) on Changes in Team Member Outcomes

A second key difference that emerged in this new analysis is that after accounting for the control variables, the engagement of active teaching was related to an *increase* in one's task performance (γ_{50} = .19, p < .05). Note that this result was also revealed in the third supplemental analysis (via group-mean centering) above. Before proceeding, I should note that in this new analysis, the interactive effects of active learning and teaching no longer have a statistically significant effect on the change in task performance (γ_{60} = .09, n.s.), although the interaction is actually significant using a more liberal criterion (p < .10); and thus this supplemental analysis does not drastically depart from this original finding.

The final key difference that emerged in this new analysis is that after accounting for the control variables, the interaction term comprising active learning and active teaching had a significant effect on a change in turnover intentions (γ_{60} = .15, p < .05). A plot of this interaction is provided in Figure 16. Note that, consistent with my arguments for Hypothesis 12, turnover intentions appeared to be the highest to the extent that both active learning and active teaching were low; however, the apparent negative relationship between active learning and the change in turnover intentions actually appears accentuated when active teaching was *low*, counter to the prediction. However, a simple slope analysis revealed that this relationship is actually non-significant (t = -1.72, n.s.).

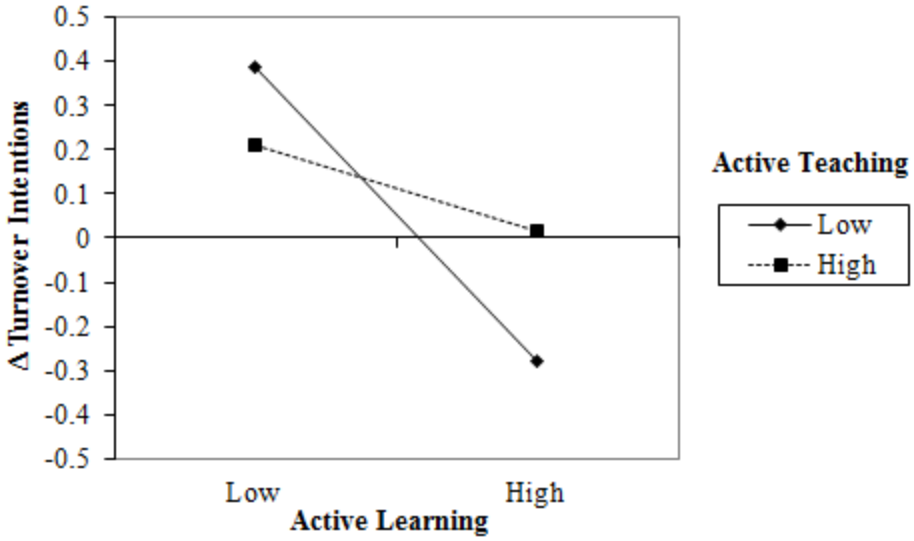

Figure 16. Interactive Effects of Active Learning and Active Teaching (Now Using Condensed Versions of Scales) on a Change in Turnover Intentions

In addition to this supplemental analysis regarding the influence of the condensed active learning and active teaching scales on team member outcomes (Hypotheses 1-12), I also performed an analysis for the moderated influence of team context on these alternative measures (Hypotheses 13 and 14). As shown in Table 14, neither epistemic motivation (represented by need for cognition) nor prosocial motivation (team identification) was found to moderate the influence of team context on either outcome.

Predictor	Active Learning$_{t2}$		Active Teaching$_{t2}$	
	γ	*SE*	*γ*	*SE*
Intercept (γ_{00})	-.32*	.18	-.24	.18
Team Size (γ_{01})	.01	.04	-.07*	.03
Team Psychological Safety (γ_{02})	-.21	.21	-.09	.15
Team Reflection (γ_{03})	.16	.12	-.02	.12
Age (γ_{10})	.01	.01	<.01	.01
Gender (γ_{20})	.15	.16	.21	.17
Active Learning$_{t1}$ (γ_{30})	.53*	.06		
Epistemic Motivation (γ_{40})	.03	.13		
Hypothesis 13a : Team Psychological Safety (γ_{41})	-.07	.29		
Hypothesis 13c : Team Reflection (γ_{42})	.11	.21		
Prosocial Motivation (γ_{50})	-.21	.13		
Hypothesis 14a : Team Psychological Safety (γ_{51})	-.20	.21		
Hypothesis 14c : Team Reflection (γ_{52})	-.09	.17		
Active Teaching$_{t1}$ (γ_{30})			.54*	.06
Epistemic Motivation (γ_{40})			-.21	.18
Hypothesis 13b : Team Psychological Safety (γ_{41})			-.37	.31
Hypothesis 13d : Team Reflection (γ_{42})			.03	.26
Prosocial Motivation (γ_{50})			.05	.11
Hypothesis 14b : Team Psychological Safety (γ_{51})			-.27	.16
Hypothesis 14d : Team Reflection (γ_{52})			-.02	.17
N (Level 1)	127		127	
N (Level 2)	27		27	

Notes:

* p < .05, one-tailed. Gender coded 1 for male, 0 female

Team Reflection coded 1 for team participation in training, 0 for control group

SE = Standard Error

Table 14. Moderated Influence of Team Context on Changes in Active Learning and Active Teaching (Now Using Condensed Versions of Scales)

The final supplemental analysis I conducted involved examining more closely the impact of the team reflection intervention. I have already tested for the moderated influence of team context (including team reflection) on changes in active learning and active teaching (Hypotheses 13 and 14; see Table 6); however, I would now like to consider the manner in which team reflection influences other outcomes. In particular, I am interested in examining how the team reflection intervention influenced team member perceptions of their team's climate. Below I sketch brief arguments for how I expect team reflection to impact perceptions of both psychological safety and relationship conflict.

First, I anticipate that team reflection will increase member perceptions of psychological safety within one's team. Discussion of shared experiences among members is likely to facilitate a positive team climate. For instance, a recent meta-analysis found that information sharing within teams predicts both cohesion and member satisfaction (Mesmer-Magnus & DeChurch, 2009). Interestingly, a number of studies have examined psychological safety as a moderator of the effectiveness of team reflection (Moreland & McMinn, 2010); yet I am unaware of any studies examining psychological safety as an *outcome* of reflection.

Second, I also anticipate that team reflection will decrease member perceptions of relationship conflict within one's team. In support of this notion, research has found that teams are less likely to experience conflict if they engage in collaborative communication (Lovelace, et al., 2001), a feature of team reflection. Moreover, teams are better able to deal with conflict if they have a norm of openness (De Dreu & Weingart, 2003; West & Anderson, 1996), which is likely to exist in reflective teams. Moreover, the process of reflection can help teams to realize

how previous conflict episodes began and unfolded over time; and as a result, the likelihood of future conflict episodes can subsequently be reduced or handled more effectively in the future.

In addition to examining whether team reflection affects these perceived changes in team climate, I am also interested in identifying moderators of this relationship as well. In keeping with Salancik and Pfeffer (1978) as well as Zalesny and Ford (1990), I consider perceptions of one's team climate to be the result of social information processing. Moreover, as argued in my development of Hypotheses 13 and 14, I expect that differences in information processing motivation (De Dreu, et al., 2008; De Dreu, Weingart, et al., 2000; Kunda, 1990) will affect the extent to which individuals will process such social information. Briefly, I anticipate that epistemically motivated individuals, vis-à-vis their deep, systematic information processing, will be especially attuned to social informational cues in their environment – and thus perceived changes in one's team climate will be more salient to such individuals. Similarly, I anticipate that prosocially motivated individuals, vis-à-vis their collective-oriented information processing, will be especially attuned to social informational cues related to their collective – and thus perceived changes in one's team climate will be more salient to such individuals. More concretely, I expect that the impact of team reflection on perceived changes in one's team climate (psychological safety and relationship conflict) will be accentuated to the extent that one's information processing is epistemically or prosocially motivated (see Figure 17). Note that I operationalize epistemic motivation as conscientiousness and prosocial motivation as agreeableness, as the results of my former supplemental analysis suggest that these generalized representations may be more superior to other, more narrow representations in this context.

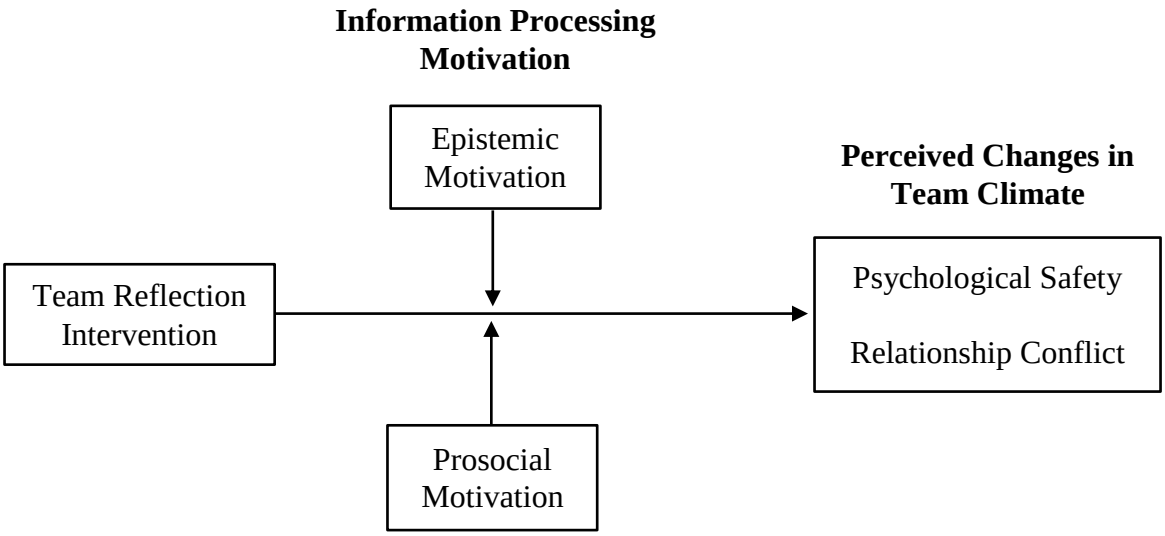

Figure 17. Conceptual Model of How Team Reflection and Information Processing Motivation Impact Perceived Changes in Team Climate

As displayed in Table 15, results indicated that after accounting for the control variables, the team reflection intervention had a positive main effect on a perceived change in psychological safety (γ_{02} = .16, p < .05); however, the proposed negative main effect on relationship conflict was only significant if a more liberal criterion is used (γ_{02} = -0.11, p < .10). To test for the cross-level moderating effects of epistemic and prosocial motivation, I entered the team reflection variable into the level 2 equations in order to test its effects on the slope of each motivation variable.

Predictor	Psychological Safety$_{t2}$		Relationship Conflict$_{t2}$	
	γ	*SE*	γ	*SE*
Intercept (γ_{00})	<.01	.09	.19	.14
Team Size (γ_{01})	-.06*	.02	.06*	.02
Team Reflection (γ_{02})	.16*	.08	-.11	.07
Age (γ_{10})	<.01	<.01	<.01	<.01
Gender (γ_{20})	-.06	.12	-.33*	.18
Psychological Safety$_{t1}$ (γ_{30})	.66*	.08		
Epistemic Motivation (γ_{40})	-.21*	.11		
Team Reflection (γ_{41})	.21	.12		
Prosocial Motivation (γ_{50})	-.07	.06		
Team Reflection (γ_{51})	.49*	.10		
Relationship Conflict$_{t1}$ (γ_{30})			.60*	.10
Epistemic Motivation (γ_{40})			.26*	.14
Team Reflection (γ_{41})			-.58*	.17
Prosocial Motivation (γ_{50})			.11*	.06
Team Reflection (γ_{51})			-.17*	.08
N (Level 1)	125		103	
N (Level 2)	27		25	

Notes:
* $p < .05$, one-tailed. Gender coded 1 for male, 0 female
Team Reflection coded 1 for team participation in training, 0 for control group
SE = Standard Error

Table 15. Impact of Team Reflection Intervention and Information Processing Motivation on Perceived Changes in Team Climate

With regard to perceived changes in psychological safety, after accounting for the control variables, the cross-level interaction between team reflection and epistemic motivation was only significant if a liberal criterion is used ($\gamma_{41} = .21$, $p < .10$). Nevertheless, as shown in Figure 18, the pattern of the interaction is consistent with my expectation – namely, the positive relationship between team reflection and perceived changes in psychological safety perceptions appears to be strengthened to the extent that individuals are epistemically motivated. Next, after accounting for

the control variables, the cross-level interaction between team reflection and prosocial motivation was significant (γ_{51} = .49, p < .05). As revealed by the plot of this interaction in Figure 19, the positive effect of team reflection on perceived changes in psychological safety was strengthened to the extent that individuals are prosocially motivated (t = 4.29, p < .05).

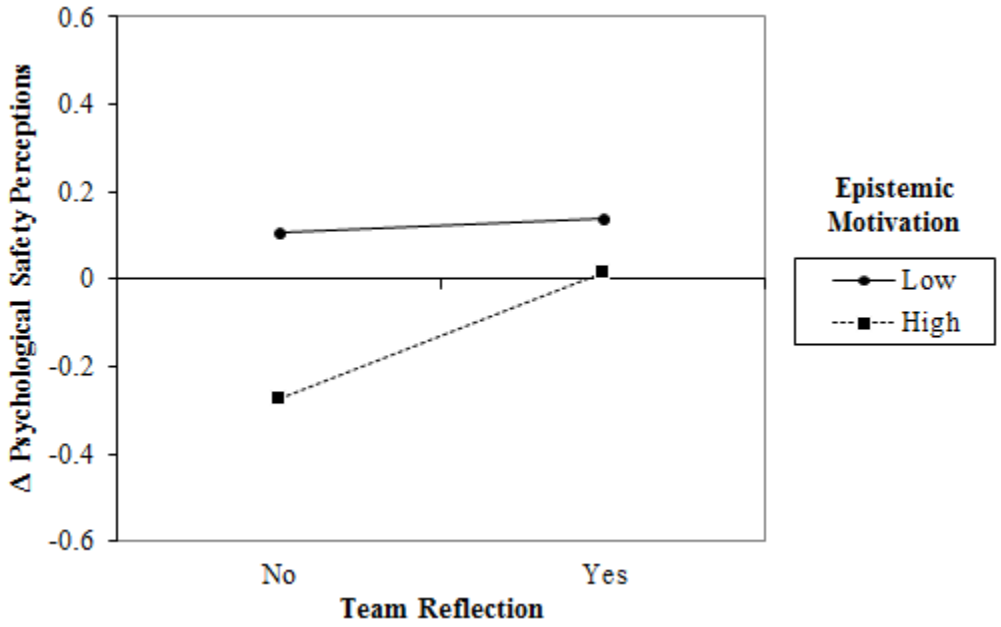

Figure 18. Interactive Effects of Team Reflection and Epistemic Motivation on a Perceived Change in Psychological Safety Perceptions

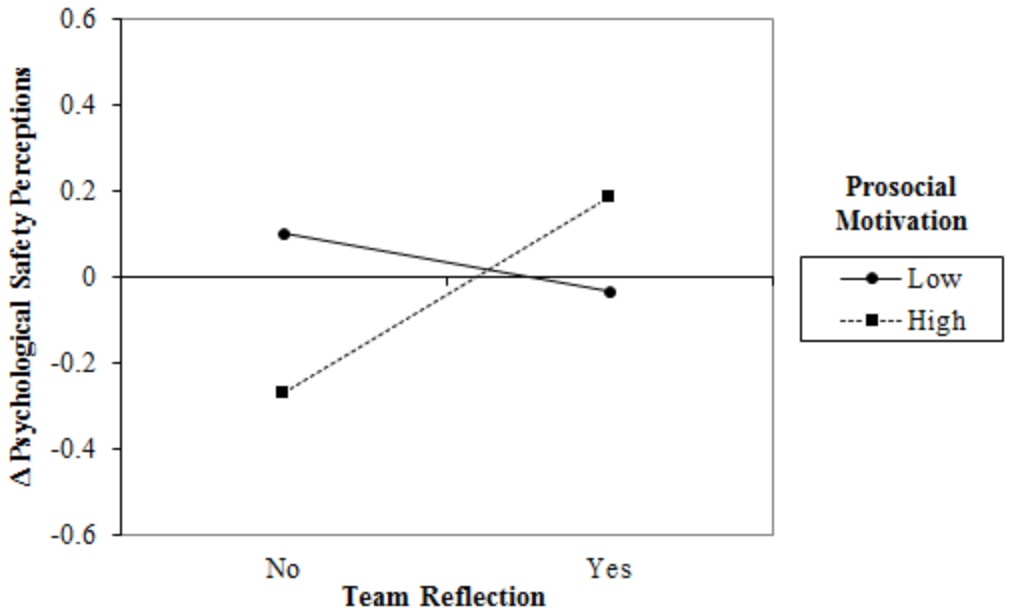

Figure 19. Interactive Effects of Team Reflection and Prosocial Motivation on a Perceived Change in Psychological Safety Perceptions

Turning now to perceived changes in relationship conflict, after accounting for the control variables, the cross-level interaction between team reflection and epistemic motivation was significant (γ_{41} = -.58, p < .05). Consistent with my expectations, team reflection had a negative effect on perceived relationship conflict, but only to the extent that individuals are epistemically motivated (t = -2.97, p < .05; see Figure 20). Finally, after accounting for the control variables, the cross-level interaction between team reflection and prosocial motivation was also significant (γ_{51} = -.17, p < .05). As shown in Figure 21, team reflection had a negative effect on perceived relationship conflict, but only to the extent that individuals are prosocially motivated (t = -2.49, p < .05).

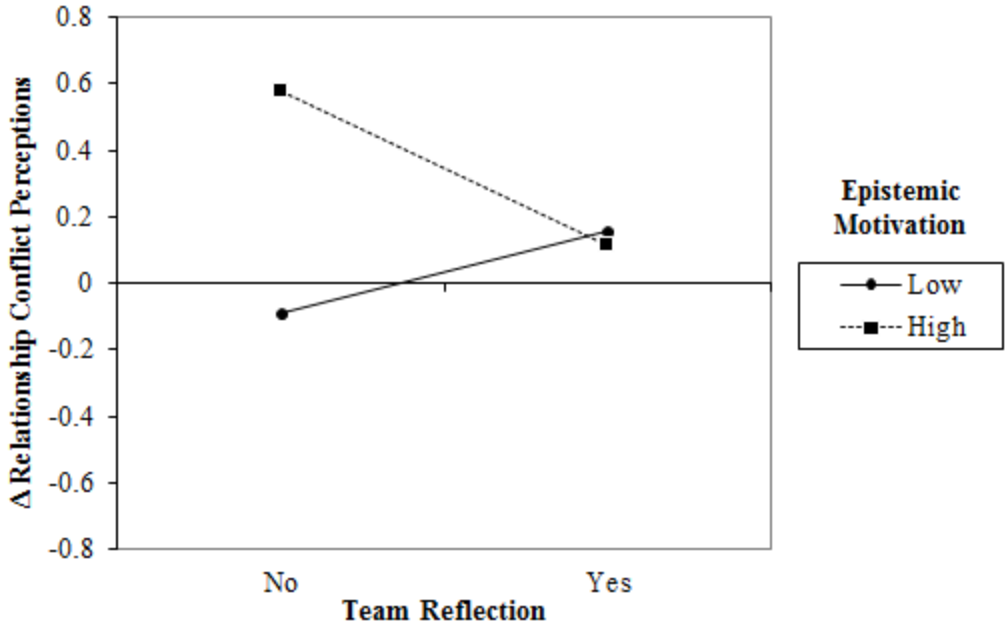

Figure 20. Interactive Effects of Team Reflection and Epistemic Motivation on a Perceived Change in Relationship Conflict Perceptions

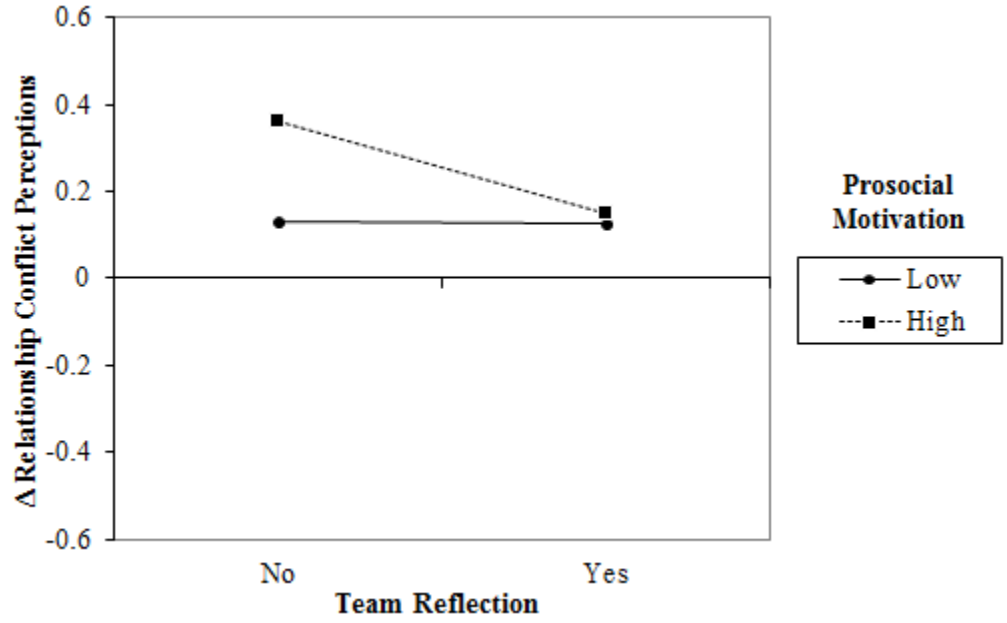

Figure 21. Interactive Effects of Team Reflection and Prosocial Motivation on a Perceived Change in Relationship Conflict Perceptions

The results of this supplemental analysis suggest that the team reflection intervention had significant effects on team member perceptions of psychological safety and relationship conflict, two outcomes that are very important for teams (Kish-Gephart, et al., 2009; Korsgaard, Jeong, Mahony, & Pitariu, 2008). Moreover, these results provide evidence for the theoretical link between social information processing theory (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990) and motivated information processing theory (De Dreu, et al., 2008; De Dreu, Weingart, et al., 2000; Kunda, 1990), namely that motivation can explain variance in the manner in which individuals process social information.

Recall that in the development of Hypotheses 13 and 14, I suggested that motivated information processing would moderate the impact of team context (team reflection and team psychological safety) on the engagement of active learning and active teaching. Unfortunately, these predictions were not supported by the data. Thus, my argument for linking together social information processing theory and motivated information processing theory may have seemed, on the surface, to be inconsistent with empirical evidence. However, I believe there is a fundamental difference between my tests of Hypotheses 13 and 14, and this supplemental analysis – namely, the dependent variables. In the former, I suggested that motivated information processing would explain variance in the engagement of active learning and teaching; whereas in the latter, I argued that motivated information processing would explain variance in team climate perceptions. In my view, the perception of team climate seems to be a more proximal outcome of motivated information processing differences as compared to behavioral enactment; and thus this is likely a better initial test to determine whether social information processing and motivated

information processing theories can be combined. Thus, future research efforts to link together these theories should pay special attention to the outcome of interest.

Overall, these supplemental analyses offer a number of interesting insights and alternative perspectives of the study results. Next, I discuss the strengths and limitations of this dissertation in addition to ideas for how scholars can use my results as a springboard for future research directions.

Strengths, Limitations, and Future Research

This study contains a number of strengths which bolster its potential contributions to the literature. First, the data sample consisted of employees working in their natural organizational environment, which is in contrast to many studies in the literature that involve simulated tasks conducted in laboratory settings. While such studies can be incredibly useful for advancing theory (Highhouse, 2009), Edmondson et al. (2007) suggested that field settings are particularly suitable to investigations of team learning processes, as the preservation of the team's natural environment is an important component in this area of research. Moreover, many of the variables included in the study necessitate a field context in order to be conceptually meaningful (e.g., team psychological safety and turnover intentions).

A further strength of the study is the rich diversity represented in the sample in terms of organizations, teams, and taskwork. The participating organizations represented a number of different industries; and across these organizations, team sizes varied substantially (ranging from n = 3 to 11). Further, the ages of members within these teams were also considerably diverse (ranging from 21 to 64 years of age). There was also heterogeneity in terms of the taskwork of these various teams: some were management or highly technical teams while others performed tasks such as maintenance or administrative duties. Overall, this sample diversity helps to extend

the generalizability of the study results to a number of different contexts rather than being restricted to any particular type of organization, team, or task.

Finally, an important strength of the study is its enhanced ability to infer causality. First, measurement of study variables was separated by time. For example, I was able to assess variables such as active learning and task performance at multiple measurement occasions. This allowed me to go beyond simply evaluating bivariate correlations at a single point in time, but instead test for *changes* in relevant variables from one time period to the next. In addition to enhancing causal inference vis-à-vis multiple measurement occasions, I also utilized a quasi-experimental design (Cook & Campbell, 1979). As both field and laboratory methodologies are valuable in testing and advancing theory (e.g., see Gordon, Slade, & Schmitt, 1986; Highhouse, 2009), some researchers have chosen to employ an amalgamation of the two approaches (Grant & Wall, 2009; Greenberg & Tomlinson, 2004)[7]. In this vein, I designed a quasi-experiment in order to develop an understanding of the impact of team reflection (a process in great need of theoretical and empirical refinement; see Moreland & McMinn, 2010) on team member outcomes. In addition, my decision to conduct this on-site team development workshop for many teams throughout a number of organizations was also motivated on a more personal level. In essence, I wanted to conduct a rather hands-on, involved[8] study in order to get "closer to the action" and thus develop a deeper and more intimate understanding of team and individual processes in organizations in addition to generating insight regarding the challenges faced by

[7] For example, my colleagues and I recently studied coordination in multiteam systems whereby United States Air Force Captains worked collaboratively on an air operations center simulation (for details, see Davison, Hollenbeck, Barnes, Sleesman, & Ilgen, 2012). The pre-programmed task and surveys were executed in a standardized and highly controlled "laboratory-like" context; however, the content of the simulation was rather familiar to participants, making the study simultaneously "field-like".

[8] And, at times, quite arduous!

organizations (see Grant & Wall, 2009, pp. 667-670 for an excellent discussion about how quasi-experimentation can help to bridge the scholar-practitioner divide).

While the study is characterized by these many strengths, there are also some important limitations to be noted. First, one could potentially argue for the existence of a selection bias in the sample, in that organizations interested in participating in a team development workshop are likely to be learning-oriented (Gully & Phillips, 2005). This could have skewed results because a learning-oriented culture may have manifested into more endorsement of active learning and teaching behaviors within teams. To combat this possibility, the study design utilized a matching technique whereby approximately half of each organization's teams were in the experimental group and the other half were in the control group. Thus, with respect to the team reflection intervention, this potential selection bias would likely not have resulted in any alteration of findings; however, with regard to other independent variables (e.g., team psychological safety), a selection bias could have potentially skewed results.

Another limitation of the study is the diversity represented in the sample in terms of organizations, teams, and taskwork – perhaps an ironic restriction given that this was also identified above as an important strength. Although a large amount of diversity in a study sample has a number of benefits, it also carries with it the inability to restrict theory to a particular context. For instance, West (1996) introduced team reflexivity as a process useful for complex decision-making teams. While some of the teams in my sample would be characterized as routinely making complex decisions (e.g., management teams), others would likely not meet this qualification (e.g., maintenance teams). Thus, the choice to include this diverse array of organizations, teams, and taskwork may have helped to boost generalizability of the study's

findings, but it also may have limited my ability to restrict effects to the particular contexts most amenable to team learning (e.g., complex decision-making or highly innovative teams).

Drawing from the results of this study, I suggest below three primary routes for future research on learning behavior within teams. First, I suggest following up on my finding regarding the interactive effects of active learning and active teaching on a change in task performance. Recall that active learning appears to be associated with an increase in task performance when active teaching is *high* rather than low. Thus, contrary to the prediction that active teaching would act as a neutralizer of the positive influence of active learning on task performance, it actually appears to have accentuated the relationship. Moreover, task performance increased the *most* to the extent that individuals engaged in both active learning and active teaching, and it increased the *least* to the extent that individuals engaged in active learning but not active teaching. Thus, leaders may have "rewarded", via higher increases in performance ratings, team members that managed to engage in high levels of both active learning and teaching within the team. By contrast, leaders may have "punished", via lower increases in performance ratings, members who only engaged in active learning but not much active teaching. Such individuals may be considered as "black holes of knowledge" within the team whereby they absorb knowledge from their environment (teammates) without sharing much in return. From a group process perspective, this finding may also suggest that the act of acquiring and sharing knowledge among teammates (i.e., active learning and active teaching, respectively) may facilitate learning at the team level, which, in turn, promotes team performance.

Future research could track team members over time to assess their balance of active learning and active teaching. Perhaps new members engage mostly in active learning, but as they gain experience or expertise, the balance starts to shift toward the active teaching of less

experienced, novice members. Or alternatively, it may be the case that certain team members tend to be predisposed to either active learning or active teaching no matter what their team experience or expertise may be. For instance, recall my finding in the supplemental analysis section whereby active learning was associated with an increase in social status. Perhaps individuals may engage in active learning because it boosts their social status in the team, and thus people with a need for social status (Flynn, et al., 2006) tend to prefer active learning. Overall, a number of interesting possibilities exist for future research to explore the trade-offs between active learning and active teaching.

Another recommendation for future research is to develop better measures of active learning and active teaching. In my theoretical development of these constructs, I drew heavily from existing theory of learning at the group level of analysis (e.g., Argote, et al., 2001; Edmondson, 1999); and therefore I adapted the popular Edmondson (1999) measure of team learning behaviors to the individual level of analysis to represent active learning and teaching (e.g., "I ask teammates for feedback on my performance" versus "I provide teammates with feedback on their performance", respectively). It is possible that active learning and teaching may be better represented by a scale that was developed specifically for the individual level of analysis. Thus, a scale development study may allow researchers to more accurately represent these constructs.

My final recommendation is for researchers to consider studying active learning and teaching in a laboratory setting. Although Edmondson et al. (2007) suggested that a team's natural environment is an important aspect to team learning behaviors, the dynamics of active learning and teaching *within the team* appear to be rather complex. Thus, studying these dynamics in a controlled environment may provide the opportunity to isolate variables and

identify potential moderators (e.g., team type, taskwork, and group composition), and then use this knowledge to conduct studies in the field. The current investigation, in its entirety, simply could not be conducted in a lab setting, due to the nature of some of the variables (e.g., team psychological safety and turnover intentions); but it seems as if the lack of support for study hypotheses is an indication that the learning dynamics within teams are more complex than anticipated.

Conclusion

There is a substantial amount of research that has been conducted on individual and team learning, but very little work has been conducted on individual learning within teams. In an effort to contribute knowledge to this underdeveloped area in the literature, I extended existing theory to suggest that two main forms of learning-oriented behavior can be enacted by team members: active learning and active teaching. In addition to considering team member outcomes resulting from these behaviors, I was also interested in the manner in which team context influences their enactment as well. Results from a quasi-experimental field study indicated that the dynamics of learning behavior within teams are more complex than anticipated; however, some very interesting insights were generated to guide future studies in this important area of research.

APPENDIX

APPENDIX

GUIDED REFLECTION OPPORTUNITY WORKSHOP

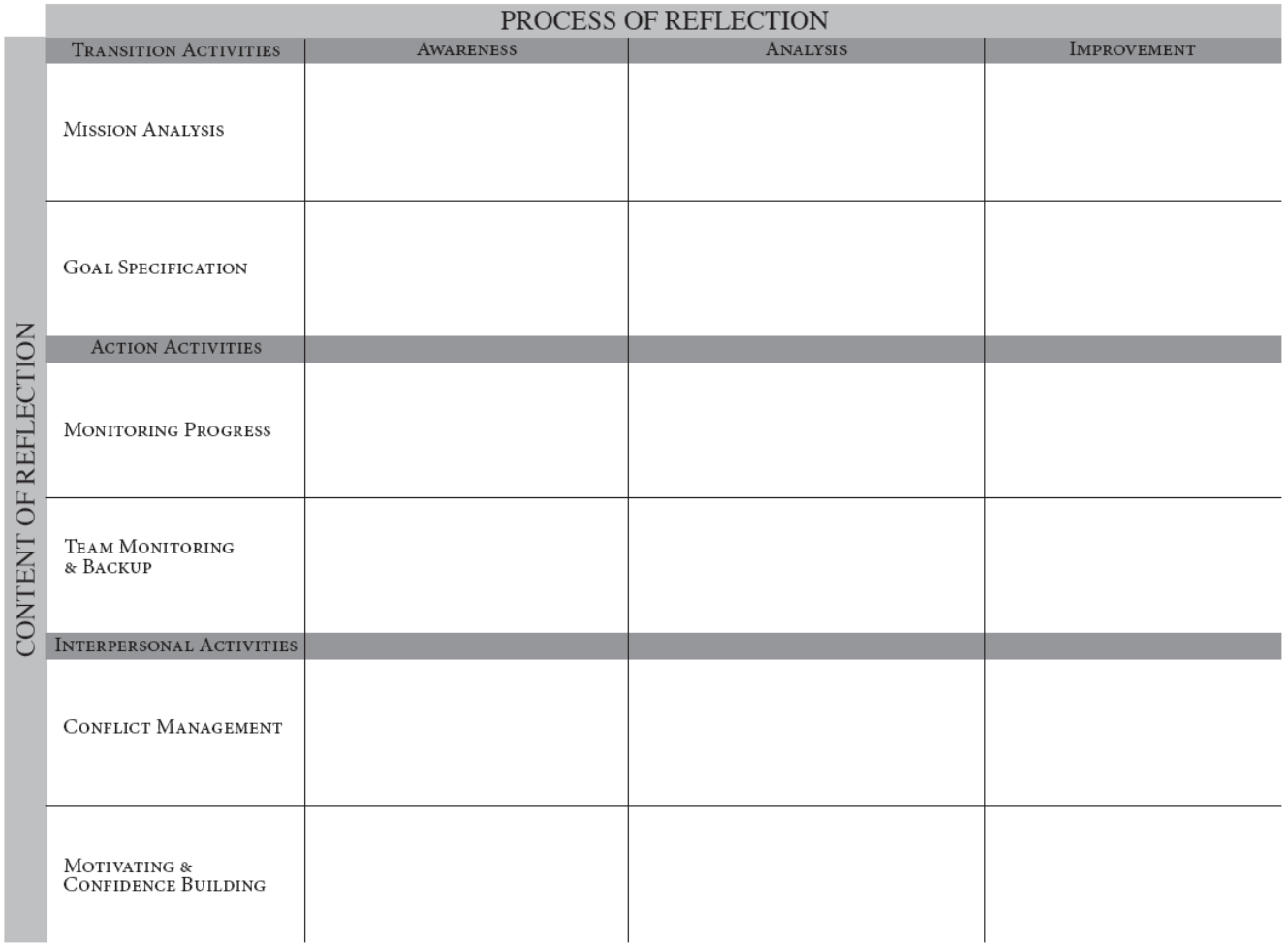

Figure 22. Training Intervention Participant Worksheet

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