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Abstract:

As a means to understanding learning and performance differences across teams, this multi-method study examines vicarious team learning – the activities by which a team learns key aspects of its task from the similar experiences of others outside the team. Vicarious learning is well understood at the organizational and individual levels, but there is surprisingly little on the subject in the teams literature. A qualitative field study of six teams in the pharmaceutical industry is used to describe vicarious team learning behavior. A separate survey study of 43 teams in the same setting is used to further develop and test the construct. The paper argues that vicarious team learning behavior is an under-explored dimension of what makes teams and organizations effective.

Key Words: vicarious learning, teams, performance

Running Header: Vicarious Team Learning Behavior and Performance

Many teams today operate in fast-paced environments characterized by technological sophistication and knowledge-intensive tasks (e.g., Edmondson, Bohmer, & Pisano, 2001). Confronted with time pressure, resource scarcity, and imperfect information, these teams are faced with an implicit choice of learning how to complete their tasks through their own experiences, or searching out others to learn from. In building on lessons learned by others, a team can speed up its process and improve its output. Losing out on such lessons and instead relying chiefly on the direct experience of team members, on the other hand, can lead to perilous inefficiencies and quality problems. Indeed, a team's ability to learn from the experiences of other teams has been noted as a potentially powerful source of performance (Argote, Gruenfeld, & Naquin, 2000a). But what do teams actually do when they engage in this kind of learning, and how are these activities associated with team performance? This paper opens up the black box of "vicarious team learning," the activities by which a team learns key aspects of its task from the similar experiences of others outside the team.

Research at the individual (e.g., Bandura, 1989) and organizational levels (e.g., Levitt & March, 1988) has shown that vicarious learning is important. Yet existing team learning theory focuses primarily on internal experiential team learning processes (e.g., Bunderson & Sutcliffe, 2003; Edmondson, 1999; Gibson & Vermeulen, 2003). There is also a rich research stream on boundary spanning in teams (e.g., Allen, 1977; Tushman, 1977; Cummings, 2004), but only recently have researchers begun to investigate what team members actually do when spanning boundaries (Ancona & Caldwell, 1992; Bunderson & Sutcliffe, 2002; Haas & Hansen, 2005; Wong, 2004; Zellmer-Bruhn, 2003). As pointed out by Edmondson (2002), while engaging effectively in learning processes across boundaries has become key in organizational teams (Ancona, Bresman, & Kaeufer, 2002), our understanding of such processes remain limited.

Some insights may be found in work by Argote and colleagues (Argote, Ingram, Levine, & Moreland, 2000b) who have convincingly argued that studies show that learning between groups within organizations can have significant performance effects (e.g., Darr, Argote, & Epple, 1995; Epple, Argote, & Devadas, 1991). These studies indicate the significance of vicarious learning activities among organizational subunits, but implications for the team level must be deduced from what is essentially organizational level research. Moreover, this work does not spell out the learning activities through which favorable learning outcomes emerge.

More recent research has begun zeroing in on some specific aspects of vicarious team learning behavior (Ancona & Bresman, 2005). A preliminary qualitative study of teams at aerospace and pharmaceutical firms indicates that vicarious learning at the team level may involve identifying experienced others from whom to learn aspects of how to do the task, and then translating their experiences to a language that makes sense in the team's own context. This can be done either by observation or by discussion with these outsiders, and often by a combination of both. Vicarious learning in teams may include learning about the processes, procedures, and routines needed to get the job done, but also learning about who possesses this knowledge. Applying these experiences can help teams better understand what the task is, how it is viewed by others, and how to get it done. It may help them to avoid repeating mistakes, often allowing them to skip unnecessary steps and even to innovate. Overall, it can help them to start at a higher level of competence than would have been possible based on experiential learning alone.

The purpose of the present study is to explore vicarious team learning, an important real-world phenomenon, by using multiple methods to describe how vicarious team learning is done and examine its effect on team performance. To reach a better understanding of how teams learn, I argue that we need to bring vicarious learning more fully into the team literature. Existing team theory does not systematically address vicarious learning, instead focusing on internal experiential team learning processes (e.g., Edmondson, 1999), external learning as a general process (e.g., Wong, 2004; Zellmer-Bruhn, 2003), or scanning of the team's external context (Ancona & Caldwell, 1992). Because of the gap in our understanding of how vicarious learning operates at the team level, this study is necessarily focused on exploration and theory development rather than confirmation and theory testing. To this end, I propose that using both qualitative and quantitative data are important. My goal is to begin to fill this gap, to situate vicarious team learning in the context of existing research on team learning, and to theorize about how it works and how it matters.

The paper starts by positioning vicarious team learning in the literature. It then proceeds to a preliminary qualitative research study of a small set of project teams to describe vicarious team learning behavior. A second study, using survey research, tests two hypotheses: that vicarious team learning behavior is distinct from other team learning constructs in the literature, and that it is positively associated with performance. Sources of vicarious experiences, processes

by which they are applied and the types of knowledge involved are also explored. Finally, the paper concludes with a discussion of implications for team learning theory, and an agenda for further research is presented.

POSITIONING VICARIOUS LEARNING IN THE LITERATURE

It has long been recognized that individuals learn how to perform tasks not only from direct experience, but also from the experiences of others (for a review, see Rosenthal & Zimmerman, 1978). In psychology (e.g., Bandura & Walters, 1963; Bandura, 1977), sociology (e.g., Elder, 1971), and organizational behavior (Davis & Luthans, 1980; Manz & Sims, Jr., 1981; Gioia & Manz, 1985) learning a task from the experiences of others has often been referred to as vicarious learning. Defined as learning a task "by watching others… or talking to them about their experiences" (Pitcher, Hamblin, & Miller, 1978: 25), vicarious learning at the individual level has obvious value.[1] As Bandura (1977) has pointed out, we do not teach kids how to swim, adolescents how to drive, or doctors how to perform surgery solely based on their own experiences of trial and error.

At the organizational level, the significance of vicarious learning has also been widely recognized (Darr et al., 1995; Levitt & March, 1988; Huber, 1991; Haunschild & Miner, 1997; Baum, Xiao Li, & Usher, 2000; Denrell, 2003; Ingram & Simons, 2002). At the team level, however, vicarious learning has not been systematically addressed.

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[1] Researchers have differed on the behavioral foundation of vicarious learning. Organizational learning research has been largely agnostic about the activities by which vicarious learning occurs (e.g., Haunschild & Miner, 1997; Levitt & March, 1988). It does not explicitly address whether it involves observation, discussion, or any alternative behavior. Individual level research has at times equated vicarious learning with observational learning (e.g., Davis & Luthans, 1980; Rosenthal & Zimmermann, 1978) and at times it has included both observation and discussion (e.g., Elder, 1971; Manz & Sims, Jr., 1981; Pitcher et al., 1978). Bandura, whose name is perhaps most closely associated with vicarious learning, equated the construct with observational learning in his early work (e.g., Bandura & Walters, 1963). In later work, he expanded the definition to include both observation and symbols, which can be expressed "through verbal or pictorial means" (Bandura, 1989: 15). This notion is consistent with more recent research in experimental psychology on vicarious learning "from dialogue and discourse" (Cox, MacKendree, Tobin, Lee & Mayes, 1999). Bandura's later work provides the definitional foothold for the team level vicarious learning construct used in the present paper.

Team Learning

Team learning behavior has been defined as the activities through which a team obtains and processes knowledge that provide opportunities for it to improve (Edmondson, 1999; 2002; Gibson & Vermeulen, 2003).[2] A key contribution of existing team learning research is the theoretical distinction between individual level and team level learning. Many scholars used to hold that learning was only meaningful at the individual level, not at the team level (Hunt, 1968); after all, as some pointed out, only people have brains (Douglas, 1986). In the wake of recent work, however, agreement has emerged that learning at the team level is not only conceptually meaningful, but also empirically important (Edmondson, 2002; Bunderson & Sutcliffe, 2003). Individuals learn, but in a team an important part of this learning is a shared understanding developed through interaction among team members. The more interdependent the team task, in turn, the more important the interaction and shared understanding. An insightful theoretical statement is the "transactive memory system" (Wegner, 1987), which proposes that team members tend to develop specialized roles of encoding, storing and retrieving knowledge. Completing a team task involves combining this system of roles with a system of communication and coordination. When taken together this is a team level construct — a notion that has recently received strong empirical support (Austin, 2003; Lewis, 2003; Edmondson, Winslow, Bohmer, & Pisano, 2003). Learning, therefore, involves not only individual skill sets, but also interpersonal patterns of communication and coordination. Important team learning behaviors in this view include asking questions, seeking feedback, sharing information, and talking about errors (Edmondson, 1999; Gibson & Vermeulen, 2003).

In general, team learning has been broken into two main types: internal and external. Until recently team learning research has largely been based on an **internal** view of team learning (Nemeth, 1986; Stasser, 1992), focusing on how teams learn tasks based on members'

[2] The definition focuses on activities as opposed to outcomes (Argyris & Schon, 1978) — a theoretically important distinction since it is quite common in the organizational learning literature to view learning as an outcome (e.g., Levitt & March, 1988). It is also empirically consequential since it allows processes and outcomes of learning to be investigated separately. Following Edmondson (1999: 353), as a rule I use "the term 'learning behavior' to avoid confusion with the notion of learning outcomes."

direct experience. Indeed, with some notable exceptions (Edmondson et al., 2003; Wong, 2004), studies of team learning have been concerned with such *experiential* learning, whether contemporaneous or stemming from past tasks.[3] These behaviors have been found to be positively related to performance (Edmondson, 1999; Gibson & Vermeulen, 2003). Through experiential learning behavior, teams are able to detect and correct errors (Argyris & Schon, 1978), and to improve members' collective understanding of a situation or discover unexpected consequences of previous actions (Edmondson, 1999). By largely staying inside the team boundary, this research does not address instances in which teams learn how to complete their tasks by turning to other teams who have been down the same road. This approach may be particularly appropriate in situations when important task experiences are lacking within the team itself.

While not pointing to vicarious learning in particular, a number of researchers focusing on team learning have recently noted the importance for teams to learn from **external** sources in general (e.g., Argote et al., 2000a; Edmondson et al., 2003). Zellmer-Bruhn (2003) measured teams' external knowledge acquisition process and showed a positive link to performance. Similarly, Haas & Hansen (2005) found a positive association, but only under certain conditions, such as a relative low level of team experience. Then, Wong (2004) demonstrated empirically how internal learning behavior ("local learning") and external learning behavior ("distal learning") differ in significant ways.

Although it has seen little explicit cross-fertilization with the learning literature, the substantial body of research on boundary spanning has provided a more fine-grained perspective on external team learning. Starting with the seminal work of Allen and colleagues (Allen & Cohen, 1969), researchers have focused on the amount of information exchanged between teams and their environment, the need to match information-processing capability to the information-processing demands of the environment (Tushman & Nadler, 1979), and the importance of boundary roles (Allen, 1977; Tushman, 1977). More recently, Hansen (1999) examined how the

[3] In the tradition of learning curve research, mainly represented by the work of Tyre and von Hippel (von Hippel & Tyre, 1995; Tyre & von Hippel, 1997), scholars have been particularly explicit about different kinds of experiential learning. This work differentiates between behaviors involved in contemporaneous "learning by doing" and those involved in drawing on past task experiences, which has been referred to as "learning before doing" (Pisano, 1996).

complexity of knowledge involved influences boundary activities. It is Ancona & Caldwell's (1992) work on what team members actually do when spanning boundaries, however, that makes the research stream on boundary spanning particularly informative for a study of vicarious team learning. They found that teams engaged in "scouting" activities – "behaviors that involve general scanning for ideas and information about the competition, the market, or the technology" (1992: 641). These activities allow a team to learn about its context, or the environment in which it is working. But are scouting activities (referred to from now on as *contextual* learning behaviors) the only activities that take place when teams seek out other teams to learn from? This paper argues (cf. Argote et al., 2000a) that contextual learning should be included in a model of external team learning behavior, but it does not paint a complete picture. Vicarious team learning crystallizes that there are different kinds of external learning behaviors, such as a specific search for lessons about how to do a specific task. These behaviors are distinct from contextual learning behaviors, leading one to theorize that there are two distinct types of external learning: contextual learning as a way of understanding the context in which the team is working, and vicarious learning as a way of learning how to perform a task.

Vicarious Team Learning in the Context of Other Related Concepts

There are a few other theoretical concepts loosely related to vicarious team learning that merit mentioning. For example, Brown and Duguid (1991) introduced the notion of "communities of practice" in which stories and insights are shared across organizational units. These communities may involve vicarious learning. They are loosely tied networks rather than teams however (Edmondson, 2002), and are typically organized around disciplines rather than tasks. When vicarious learning occurs in communities of practice, therefore, it tends to be at the individual level. A community of practice may also be a target of a team's vicarious learning behavior. Other related research streams have focused on best practice transfer (e.g., Szulanski, 1996), knowledge transfer (e.g., Argote & Ingram, 2000; Szulanski, 2000), and external relationships in transactive memory systems (Austin, 2003). The present study is qualitatively different from these streams in several ways, and most importantly in that its focus is on actual team level learning behavior. Nonetheless, research on vicarious team learning behavior may help shed light on important aspects of these concepts. For example, introducing vicarious learning behavior to the discourse can add insight to the activities driving effective best practices transfer. It can

further contribute to the knowledge transfer literature by explicating the activities involved in transferring a kind of knowledge that has been pointed to as particularly important, namely that of task experiences (Argote &Ingram, 2000). Research on vicarious team learning may also help us better understand how transactive memory systems form by focusing our attention on the activities involved in identifying experienced others outside the team. Such potential contributions fall outside the focus of the present paper, however, and will not be discussed further here.

Toward a Fuller Understanding of Team Learning

In sum, team learning research has focused primarily on the importance of experiential learning inside the team. To a lesser extent, it has pointed to the importance of learning from external sources, but it has not systematically identified different kinds of external learning behaviors: importantly, vicarious learning as a way of learning how to perform a task, and contextual learning as a way of understanding the context in which the team is working. The boundary spanning literature, on the other hand, has identified different kinds of team boundary spanning behaviors. It has not, however, addressed vicarious learning behaviors.

We know from research on the individual and organizational levels that vicarious learning is important. To reach a fuller understanding of how teams learn, we need to bring vicarious learning into the team literature and understand how this process operates at the team level. Because of the lack of research, the first task in building an understanding of vicarious team learning is to describe the range of activities that teams use to engage in vicarious learning behavior.

STUDY 1: PRELIMINARY QUALITATITVE RESEARCH

I anchor the notion of vicarious team learning in descriptive detail from a two-year field study in a large pharmaceutical firm, referred to here as Pharmaco.[4] Specifically, the study focused on

[4] Study 1 began as a very broad study of team learning in a dynamic environment. Quite quickly, however, vicarious learning emerged as a crucial construct in how the studied teams learned. The resulting study provides descriptive detail of vicarious team learning. Later, Study 2 explores whether similar patterns emerge across a broader sample.

learning behavior in in-licensing teams within the drug development operations of the firm. These are project teams charged with researching all aspects of a molecule discovered by an external source, typically a small biotechnology firm, with the objective of acquiring and developing the molecule into a marketable drug. The process ends with the decision to acquire or not to acquire the molecule. For pharmaceutical firms, this has become a strategically critical task in the wake of the molecular biology revolution (Aitken, Lamarre, & Silber, 1998; Longman, 2001).

In-licensing is an attractive research setting for studying team learning. Drug development is a high technology operation dependent on complex knowledge. Teamwork in this task environment requires a high level of interdependence and intense interpersonal interaction. In-licensing teams are uniquely suited for a study of learning because they have to work with a technology for which they typically have little intuitive understanding at the outset, since the molecule originates outside their own research organization. As a consequence, they have to climb a steep learning curve in a relatively short time. Drug in-licensing teams are not representative of all organizational teams. However, salient in the task environment faced by these teams are many of the difficult challenges faced by teams operating in fast-paced, innovation-driven organizations today (Ancona et al., 2002).

The heart of this study is a multiple-case research design (similar to Brown & Eisenhardt, 1997; Eisenhardt, 1989; Yin, 1989) used to explore learning in six project teams at Pharmaco. See Table 1 for details (team names are disguised at the request of Pharmaco.) The sampling frame used to select cases included two criteria designed to facilitate comparison: that samples of projects should be in therapeutic programs that are comparable in terms of the kinds of processes and technologies involved, and that all the sampled projects involved molecules at a similar stage of development. The primary data source was 92 semi-structured interviews with individual respondents, 54 of which were taped (confidentiality concerns prevented me from taping all interviews). I interviewed most core members of each team (75-100 %). The top manager who was ultimately in charge of any given project was also interviewed. Due to the high level of detail desired, I conducted two to three follow-up conversations for each case and had interviewees review case descriptions and add some details. A team member interview guide was used that contained open-ended questions related to the team process, and some probing questions about how the team engaged in learning. In addition, I attended management meetings,

project team meetings, presentations by management consultants, conferences and workshops, and had access to secondary sources from Pharmaco such as newsletters, project reports, email correspondence, strategy documents, and process manuals. Additional information on data collection and analysis is available on request.

--- Insert Tables 1 and 2 about here ---

A careful analysis resulted in three general findings. First, team members made a clear distinction between learning how to perform a task by relying on their own experiences, and learning from experienced others outside the team. Team members also identified the collection of contextual information, such as market data, as yet another distinct set of activities. Second, operating with low internal task experience, team members tended to prefer vicarious learning to experiential learning for reasons of both efficiency and quality of their work. Third, teams engaging in high levels of vicarious learning behavior were rated as better performers according to external raters than those that did not.

A typical example of what was seen time and again during the study can be found in the story of the Beta team – an in-licensing team at Pharmaco that was working on a new anti-inflammatory drug. By far the biggest challenge facing the team was that none of the team members had prior experience with the kind of drug they were now charged with developing — a common situation for in-licensing teams. From the outset Beta turned to learning vicariously.

The first team meeting was devoted to finding out who on the team knew what, what they did not know as a team, and where to find out. Since the type of task was new for all team members, one of the first things they did was to identify teams and individuals within and outside their company from whom they could learn. Soon they found another Pharmaco team, referred to here as the Alpha team, which was about to conclude a project involving a similar kind of drug. Numerous times during the project Beta invited the Alpha team to discuss how to complete the task, and when face-to-face meetings were not feasible, the teams communicated via phone conferences.

Alpha's advice on how to identify promising molecules led Beta to the source of the specific molecule — developed at a mid sized biotech firm — that became the core of Beta's drug development project. Alpha continued to play an important part in the development process,

putting Beta in touch with external experts. For example, they referred Beta to a team of two external clinical consultants who helped assess the molecule's scientific quality. After Beta concluded that toxicology was an area of concern, and that an elaborate series of tests needed to be designed and carried out, Alpha advised them on a specific type of instrumentation that they recently had acquired for a similar series of tests. Hence, equipment was shipped to Beta's lab where Alpha team members demonstrated its use. Once Beta mastered the essentials of the new equipment, they were able to use a checklist of tasks to perform and questions to ask handed down by Alpha.

Alpha members also noted steps that they could have skipped and mistakes that they wished had been avoided. For example, Beta was told about an expensive set of clinical tests that Alpha had deemed necessary to fulfill the regulatory requirements, but turned out not to be.

Alpha was not the only team Beta turned to during the learning process. As testing progressed and the molecule continued to look promising, Beta decided to acquire and develop the drug, a process requiring difficult negotiations. In preparation, Beta held a weekend workshop with a team of seasoned Pharmaco negotiators. Every Beta team member interviewed in the study agreed that this was critical to the drug's eventual success. Although the tutors' experiences emanated from projects that in many ways were different, Beta was able to extract valuable lessons and apply them to their own negotiation. They even came up with innovative deal structures that, although based on the templates discussed in the workshop, the tutors themselves had not seen before. In the end, they acquired the molecule, which went through the development process in record time, and eventually became Pharmaco's best selling drug.

In sum, vicarious team learning at Pharmaco — as illustrated by Beta's experience — involved a range of different kinds of behaviors. At times it involved team members observing members of other teams operating a piece of equipment before using it themselves. At times it involved adopting checklists developed by other teams on how to execute tasks. Sometimes the learning was more abstract, such as when teams drew on lessons learned by other teams in one context, extracted common attributes, and applied them in their own context. At other times, learning vicariously allowed team members to skip steps that had proved unnecessary in the past. Evidence pointing to the important role of vicarious learning behavior was found in all the studied teams. More importantly, the study helps to delineate specific sub-behaviors within the context of vicarious team learning. Table 2 outlines these sub-behaviors and presents quotes

from team members that illustrate the specific behavior. These activity categories provide the basis for the scale measuring vicarious team learning behavior in the survey research described next in Study 2.

This account of the study at Pharmaco serves to clarify the notion of vicarious team learning by exploring its various aspects and grounding it in descriptive detail. In all, a wide range of behaviors related to vicarious learning was found. Some were undertaken by individual team members, others by the entire team. Some involved conferring with experienced individuals outside the team, but most related to teams that had "done it before." Most importantly, these behaviors appeared to play a key role in how the teams at Pharmaco learned, or did not learn, how to complete their task.

STUDY 2: SURVEY RESEARCH

The qualitative research conducted in Study 1 provides a description of vicarious team learning. This research leads to the next step in establishing vicarious learning as an important team-level construct: formulating and testing hypotheses.

Hypotheses

Vicarious team learning behavior as a distinct construct. Having described vicarious learning behavior, the next step is to examine its distinctiveness. It is particularly important to compare and contrast vicarious team learning to the other team learning constructs identified in the literature review: experiential and contextual team learning.

Experiential team learning behavior draws on team members' direct experiences to complete specific tasks. It is similar to vicarious team learning in that it constitutes a specific search for ways to complete specific tasks, but it contrasts with vicarious team learning behavior in that it does not involve spanning the team boundary.

Contextual team learning behaviors are similar to vicarious team learning in that they involve boundary spanning. However, they contrast with vicarious learning behavior "in that they relate to general scanning as opposed to handling specific… issues" (Ancona & Caldwell, 1992: 641). Vicarious learning behaviors, as delineated in Study 1, relate to a specific search associated with specific tasks. Furthermore, vicarious learning behaviors are about learning *how*

to do a task, whereas contextual learning behaviors are about learning *what* is out there. This implies a key difference in the primary kind of knowledge involved. The imagery of a continuum with "know-what" on one end and "know-how" on the other is helpful to illustrate the significance. Knowledge as know-what is about what something means, while knowledge as know-how is about how something is done. Know-what is codified, simple, and easy to transfer, while know-how is tacit, complex, and difficult to transfer (von Hippel, 1994). Contextual learning leans toward know-what on this continuum, while vicarious learning is tilted toward know-how (Edmondson et al., 2003). Thus, both contextual learning behavior and vicarious learning behavior are forms of boundary spanning – or in Wong's (2004) terminology, both are sub-categories of distal learning – but they are theoretically distinct forms of boundary spanning. Table 3 compares the three kinds of team learning along the dimensions of boundary spanning, search modality, and knowledge type. Note that the distinctions are matters of degree. The intention is not to defend the definitional boundaries – there is some overlap between constructs – but to draw attention to important differences.

--- Insert Table 3 about here ---

Teams' need for and ability to engage in different kinds of learning behavior differ (Edmondson, 1999). Therefore, there are strong reasons to believe that the theoretical differences among the three kinds of learning should be reflected in practice. Indeed, as we saw in the Pharmaco study, team members made a clear distinction between learning how to perform a task by relying on their own experiences and learning from experienced others outside the team. They also saw the collection of contextual information, such as market data, as yet another distinct set of activities. This leads to the following hypothesis.

Hypothesis 1 (H1): *Vicarious team learning behavior is distinct from both experiential team learning behavior and contextual team learning behavior.*

Performance effects of vicarious team learning behavior. The findings from Pharmaco, coupled with the finding from organizational learning research (Darr et al., 1995), give us strong reasons to expect that vicarious team learning behavior is positively associated with team performance –

particularly in settings where there are pioneering teams to learn from (Edmondson et al., 2003). As suggested by Ingram & Simons (2002), learning from the experiences of others is likely to be related to performance since it expands the space of learning opportunities in general. More specifically, the study at Pharmaco suggests that vicarious learning behavior can provide opportunities to improve the efficiency and the quality of team outcomes. By not reinventing the wheel through their own trial and error processes, team members can save time and thereby speed up the process and improve efficiency. By avoiding repeating mistakes and drawing on lessons learned to come up with innovative solutions, team members can improve quality. In general, engaging in vicarious learning behavior can give teams a better understanding of how to get the job done than would have been possible based on experiential or contextual learning behaviors alone.[5] This leads to our second hypothesis.

Hypothesis 2 (H2): *Vicarious team learning behavior is positively associated with performance in organizational teams.*

Sample

The data used to test the hypotheses come from the drug licensing departments of six large pharmaceutical firms. This is the same setting (in-licensing teams) as that of Study 1, but the studies are separate and Pharmaco was not included in Study 2. Focusing on one industry setting is attractive since it removes any industry-related variance from the sample and therefore reduces unobserved heterogeneity. All firms in the sample retain in-house drug discovery as well as pre-clinical and clinical development capabilities. Access was largely negotiated through the

[5] Bunderson & Sutcliffe (2003) argued that the relationship between team learning behavior and performance can be curvilinear in the near term under some conditions. Similarly, Haas & Hansen (2005) questioned whether more external learning behavior is always better. Edmondson (1999), on the other hand, argued that for organizational teams facing change the risk of wasting time is small compared to the gain and found a linear relationship between team learning behavior and performance. The teams studied here are similarly facing extreme change, and the immediate risk in this setting is of teams spending too much time learning vicariously, rather than too little. This is an important theoretical question that will be explored further in the discussion of boundary conditions at the end of the paper.

members of the Healthcare division of the Licensing Executive Society (LES), an international professional association. Using the sampling frame described next, four to ten project teams within each firm were randomly sampled for study. The final sample size was 43 teams. Among the sampled projects, 30 ended in an agreement to acquire the molecule and 13 did not. This distribution was random and not part of the sampling frame.

The selected project teams had concluded their work no longer than one year prior to the study — and typically no more than six months prior — at the time of data collection. The retrospective collection of team data was a design selected for practical reasons encountered in the field. These circumstances and the steps taken to mitigate and test for retrospective biases are discussed in the Appendix to this paper. The focal molecules were all drugs at the early stage of development (pre-clinical stage or very early clinical stage) and although they were not all in the same therapeutic class, they were similar in the sense that the set of issues confronting the teams were highly comparable. This rather technical assessment was done in consultation with a panel of industry experts from LES.

I interviewed each team leader about the project, and also interviewed one additional team member opportunistically in 16 of the teams for a total of 59 interviews. Then, I distributed a questionnaire instrument to the team leader and at least two other randomly sampled team members. Team membership ranged from four to eight people, averaging 5.4 members, and the questionnaire responses represented 38-75% of the team membership.[6] Consistent with previous research on organizational teams, the number of three respondents is judged to be both sufficient and cost-effective (Libby & Blashfield, 1978; Hauptman, 1986). The response rate was high at 90 percent.

Three external performance raters for each team were randomly sampled from the permanent high-level board that pharmaceutical firms keep to review their teams' progress – sometimes referred to as the Licensing Assessment Board. The typical board member is a senior executive with a long career in research or business development. Board members become

[6] This data refers to members who had been involved throughout the duration of the project, often referred to as "core team members." Drug development teams also involve short-term members, often referred to as "support team members," who perform routine lab tests, etc. When support team members are included, the team size averaged 18 members.

intimately familiar with the in-licensing teams' work through regular updates and presentations. The raters were asked to assess team performance after the conclusion of the project. The time lag between the time the project ended and the time of assessment was typically six months, and never longer than one year. Extracting responses from high level executives proved harder than from team members, but nevertheless the response rate was 70 percent.

Measures

The key measurement instruments were a team questionnaire and an external rater questionnaire. Most key measures included in the questionnaires were developed with the Likert scaling technique (with scale item responses running from 1 = "strongly disagree" to 7 = "strongly agree"). When possible, I utilized scales already established as having high levels of reliability. When a pre-existing scale did not exist, which was the case with vicarious team learning behavior, such a scale was constructed (DeVellis, 1991; Hinkin, 1998). Having generated an initial pool of items, I had them reviewed by an expert panel spanning several organizations in the research setting as well as fellow academics. I then pre-tested the scales in a small sample, which resulted in a reduction of items. The final scales were analyzed in terms of their internal consistency reliability and discriminant validity. The results of this analysis are presented below. In addition, important team specific information was collected in an interview with each team leader and important organization specific information was collected in an interview with a high-ranking representative of each firm. When possible, I also obtained archival records for purposes of triangulation.

Dependent variables. In previous research, the performance of project teams in product development settings has been measured by sales revenue and speed (Hansen, 1999), neither of which is valid in the setting studied here. Not all projects ended with an acquisition, and even those that did had still not reached the market at the time of this research project. Similarly, in the highly regulated and interdependent setting of pharmaceutical in-licensing, team members themselves often do not have full control of the speed of the process.

To test the effect of vicarious team learning behavior on team performance (H2), I assembled a set of established scales that have been successfully deployed to measure efficiency, quality, and overall performance in similar contexts in the past (Henderson & Lee, 1992; Guinan,

Cooprider, & Faraj, 1998; Edmondson, 1999; Faraj & Sproull, 2000). For example, given the task and compared to other teams that they were familiar with, raters were asked to assess the extent to which a team had done "superb work," and how they rated a team's efficiency, quality, and goal achievement. In addition, following the methodology of Brown & Eisenhardt (1997), I developed a scale based on how informants defined success. This scale asked raters to assess the quality and efficiency of a team's work broken down into financial and scientific aspects. A common factor analysis of the final nine-item scale yielded one single factor with an eigenvalue larger than one — the cut-off criterion of Kaiser's eigenvalue rule (Nunnally, 1967). A scree test strongly supported the one-factor solution. This result makes it impossible to test effects on efficiency and quality separately, and therefore H2 is tested with one global measure of team performance. Internal reliability was high ($\alpha = .94$).

Finally, since some projects ended in an acquisition and others did not, a t-test was used to assess any response bias among raters attributed to this aspect of the outcome. No significant differences were found.

Vicarious team learning behavior. The central explanatory variable of the study is vicarious team learning behavior. To capture this construct, I developed a six-item scale — mainly based on my qualitative research at Pharmaco. It includes items such as "This team observed the work of others outside the team to help us extract lessons that we could apply to our own task" and "We invited people from outside the team to discuss how to avoid repeating past mistakes." The complete scale is shown in Table 6 along with the other independent variable scales. Its items reflect the activity types of Table 2. Internal reliability was high ($\alpha = .79$).

Other independent variables. The first additional explanatory variable related to team learning, *experiential* team learning behavior, is assessed using a five-item scale developed by Edmondson (1999) as an approximate measure (example: "People in this team often spoke up to test

assumptions about issues under discussion") (α = .74).[7] To capture the final variable related to learning discussed here, *contextual* learning behavior, I use an established four-item scale labeled "scouting," first developed by Ancona & Caldwell (1992), as an approximate measure (example: "This team spent time and effort finding out what competing firms or teams were doing on similar projects") (α = .79).

Using established scales developed in a different context means that some aspects of the underlying theory may not be captured. For example, while trial and error is part of experiential learning, this facet is toned down in Edmondson's measure. Similarly, while the theory of contextual team learning clearly emphasizes general ideas (Ancona & Caldwell, 1992), the scale items leave the level of specificity more open to interpretation. This may imply some overlap with the vicarious team learning scale. It is of value to investigate whether the concept of vicarious team learning is different from established measures of team learning. Therefore, I chose to use these established scales rather than to construct additional original scales. Going forward, however, there is room for expanding how we measure these constructs.

Control variables. I control for several variables that comparable studies have found may influence team performance (Ancona & Caldwell, 1992; Edmondson, 1999; MacCormack, Verganti, & Iansiti, 2001; Cummings, 2004). *Team size* is a count of members in the in-licensing team. *Team duration* is a count of the number of months from start to finish of the project. *Resources* is measured by asking team members to assess the availability of financial, personnel, and equipment resources (Cummings, 2004) (α = .71). Finally, I measure team *experience* by averaging the time individual team members have been working with in-licensing teams.[8]

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[7] The original scale is labeled "team learning behavior." The adjusted and more specific label accentuates that the scale measures one kind of learning behavior, rather than a global construct. Professor Edmondson was consulted to ensure theoretical consistency. Furthermore, the scale was shrunk from the original seven-item scale by removal of the two scale-items yielding the weakest statistical properties in Edmondson's study.

[8] I also assessed team member experience with regard to the technology, the function, their current position, the firm, and the industry. None of these aspects of experience had any significant correlation with any of the independent or dependent variables of the model. For parsimony, they are therefore excluded from this analysis.

Another potential control variable is the nature of the relationship with the external party from which the molecule is sourced (Sobrero & Roberts, 2001). If there is a long established relationship or if the relationship is particularly good, or bad, then team learning behavior may be influenced. There might be a direct relationship with performance as well, however, and if so this should be controlled for. For this purpose, I measured the number of times the partners had been involved in an in-licensing project together. I also used a two-item scale to measure the quality of the relationship ("Our relationship could not have been better" and reversely scaled "Our relationship was very difficult"). Neither of these measures had a significant relationship with the learning constructs or performance because of lack of variance in the sample, and therefore, they are not included in the analysis.

Analytical Strategy and Preliminary Analysis

The analysis involves three key steps. First, I assess the adequacy of the measures with psychometric analysis. Second, I use common factor analysis to assess the uniqueness of vicarious learning behavior compared to experiential learning behavior and contextual learning behavior (H1).[9] Third, I analyze the relationship between vicarious team learning behavior and performance using random effects linear regression models (H2). Hence, firm effects are controlled for. There are three reasons why a random effects specification is preferable to a fixed effects model to control for firm effects in this case. From the practical viewpoint, a random effects model is preferable in a small data set since it consumes fewer degrees of freedom (one instead of six in the present analysis.) Substantively, it makes sense to assume that the firms in the data set are drawn from a random sample since the analysis addresses differences in the teams and not the firms from which they originate. Finally, a Hausman test was run for each model, which confirmed that the random effects specification is consistent with the data. As a further check I computed fixed effects models. As expected this resulted in lower significance

[9] This technique, sometimes referred to as exploratory factor analysis, is particularly appropriate as a tool for hypothesis testing in this case. As DeVellis has argued (1991: 108), "finding by means of [exploratory] factor methods that items group together as suspected should be even more assuring to the investigator" than using what is commonly referred to as confirmatory factor analysis "because the analysis has not been asked to 'look for' a specific pattern. Instead, it has found the anticipated pattern on its own."

levels, but the parameter estimates remained stable, which supports the assumption of randomness.

I conducted preliminary analyses to assess the psychometric properties of the instruments. First, Cronbach's alpha was computed for all reflective scales to assess internal consistency reliability. All alpha coefficients for the reflective scales are above .7, which lends support to the adequacy of the measures for substantive analysis (Nunnally, 1967). Second, correlations were calculated for the main variables in the study (Table 4). One early observation is that neither team size nor duration is significantly correlated with performance or any of the team learning variables.

--- Insert Tables 4 and 5 about here ---

Third, not only must a team level variable be conceptually meaningful at the team level, but data collected from individual respondents to assess a team level attribute must also converge (Kenny & La Voie, 1985). To assess inter-rater reliability, intraclass correlation coefficients using one-way analysis of variance, known as ICC (1) (Shrout & Fleiss, 1979), were calculated for the team level variables based on reflective scales. As shown in Table 5, all coefficients are greater than zero and significant, which indicates sufficient inter-rater reliability.[10]

Results

The distinctiveness of vicarious team learning behavior. The first purpose of this survey study is to investigate whether vicarious team learning behavior exists as a set of activities different from what is already established in the literature (H1). To this end, the individual level responses to the 15 items related to team learning were factor analyzed to establish the discriminant validity of the scales. The analysis resulted in three factors with eigenvalues larger than one, and a scree

[10] Compared to past research on organizational teams, the coefficients in Table 4 are generally larger than in some studies (Edmondson, 1999) and smaller than in others (Gibson , 2003). The empirical settings of these studies are highly comparable. I also calculated interrater agreement using r_{WG} (e.g., Zellmer-Bruhn, 2003). All scores were higher than .60, an often-cited cut-off point (Glick, 1985).

test supported the three-factor solution. Table 6 presents the results after a varimax rotation using a cut-off criterion of >.40.[11]

--- Insert Tables 6 and 7 about here ---

The factor analysis replicated the item groupings of the scales precisely, which gives support to the initial hypothesis about how the items should relate to one another (DeVellis, 1991). Most importantly for the purposes of this study, all the items of the vicarious team learning behavior scale load cleanly onto one factor. Notably, although the part of the scale that explicitly captures vicarious learning through observation has the lowest factor structure correlation, it does load distinctly onto the same factor as the component that addresses vicarious learning through discussion. This supports the notion of both observation and discussion as parts of a team's repertoire of vicarious learning behavior.

In combination with the significant intraclass correlation coefficients shown in Table 5, these results lend support to hypothesis H1 that the vicarious learning behavior is a team level construct distinct from both experiential learning behavior and contextual learning behavior. To illustrate the qualitative differences among the constructs of the quantitative analysis, quotes from the team member interviews are displayed in Table 7. It shows team members discussing activities that reflect experiential, contextual, and vicarious learning.

Vicarious team learning behavior and performance. The second objective of the survey study is to examine the performance effects of vicarious team learning (H2). To test the relationship between different kinds of team learning behavior and performance, I ran regression models using team-level composites of the external raters' ratings of team performance as the dependent variable and measures obtained from team members as regressors. Table 8 shows the key results and, for parsimony, the only significant control variables: experience and resources.

[11] A number of different common factor analysis techniques exist. I use principal components with varimax rotation since this is the technique used in key antecedents to this research (Ancona & Caldwell, 1992; Edmondson, 1999; Cummings, 2004). Hence, comparison across similar studies is facilitated.

Adding vicarious team learning behavior to the baseline regression model reveals that vicarious team learning behavior is a significant predictor of team performance and that it adds substantially to variance explained (model 2). When the same minimal test with one learning variable was repeated using experiential learning (model 3) and contextual learning (model 4), it yielded similar results. When all variables of the model are added together, contextual learning drops to statistical insignificance while the other learning variables remain significant (model 5). Taken together, models 1 to 5 support hypothesis H2 that vicarious team learning behavior is positively associated with performance.

--- Insert Table 8 about here ---

Additional analysis. Linear regression models are likely too simple to capture the many facets of the team learning process as it plays out in an often-chaotic task environment. For example, the fact that contextual learning behavior drops to statistical insignificance when added to the model together with vicarious learning behavior should not be interpreted as if the variable loses its significance in practice. More likely they co-exist, and furthermore, contextual learning activities are likely to yield opportunities for vicarious learning and vice versa. The high correlation between the two constructs in Table 4 appears to suggest as much. The small *N* of the study makes it difficult to draw any firm conclusions, but adding experiential learning (model 6) and contextual learning (model 7) separately gives some indication of a close relationship between the two constructs — contextual learning drops out when considered jointly with vicarious learning, while experiential learning does not. In this case, the importance of vicarious learning appears to trump the importance of contextual learning in explaining team performance, but it is easy to imagine circumstances in which the opposite would be true, such as a context in which knowing how to complete a task is less of a concern than knowing what competitors are up to. The relationship between vicarious and experiential learning is intricate too. For example, the effect size of vicarious learning is the same or slightly greater than that of experiential learning when the two are considered jointly (models 5 and 6), but the effect size of experiential learning on its own (model 3) is greater than that of vicarious learning on its own (model 4). Selectively dropping variables from the models makes substantive interpretation perilous, but the exercise does suggest the presence of a nuanced relationship. Even so, the objective here is not to

demonstrate the differential effects of various kinds of team learning behavior on performance. Rather, it is to examine vicarious learning behavior as a distinct team level construct and its association with performance. The evidence presented here serves both these aims. [12]

Exploring the sources and application of vicarious experiences, and knowledge type. This study seeks to explore an important phenomenon that we know little about, so any further light shed is useful. In this spirit, I approached the team leaders of eight of the 43 teams that reported particularly high levels of vicarious learning behavior with three additional sets of questions (with items running from 1 = "strongly disagree" to 7 = "strongly agree").

First, the team leaders were asked about the extent to which the team turned to any of seven distinct sources when seeking out the experiences of others to learn about how to do their task. The categories were selected based on extensive interviewing (I further asked about "other sources," but this did not yield additional insights.) The sources are followed by the average rating and standard deviations: members from past teams (6.13, 1.13), members from ongoing teams (3.25, 1.91), other internal experts (4.63, 1.51), external experts (3.88, 2.03), members of the licensor organization (3.13, 1.36), documents compiled by other teams (5.38, 1.19), public databases and journals (1.75, 1.04). A number of observations stand out. First, members of past teams that had completed similar tasks were the most important source by far. Second, ongoing teams (teams currently in the process of completing a specific project) were not a common source. Interviews indicated that a key reason is the unproven value of experiences from a project that has no known outcome. Third, public databases and journals were rarely used as sources. (By contrast, these sources appeared to be an important target for contextual learning behavior.) Finally, while documents compiled by other teams scored high in general, interview

[12] The questionnaire used for this study also comprised a number of scales that were not part of the model, but that are well represented in the literature. These scales include leader behavior (Hackman, 1987), task, process, and relational conflict (Jehn, 1997), and psychological safety (Edmondson, 1999). The limited degrees of freedom mean that these cannot be included in addition to all the model's variables. Including the additional variables together with the three learning variables, but without controls, did not notably change the effects of the independent variables. The lack of degrees of freedom further means that the data does not lend itself to reliable tests of interaction effects between variables.

data suggested a more fine-grained story. In particular, these documents were largely used to find names of people to seek out for further advice. For example, project team reports were generally used to track down the members behind the report rather than to extract lessons from the report itself.

Second, team leaders were asked how vicarious experiences were applied to the task. Five kinds of application processes were induced from the interview data collected at Pharmaco in Study 1. Short descriptions are followed by average ratings and standard deviations: (a) Application allowed the team to skip steps (5.50, 1.69). This may include not running a lab test found unnecessary by a previous team, or using only the conclusions of an analysis done by a previous team without doing the actual analysis. (b) Application allowed the team to avoid repeating mistakes (5.63, 1.30). For example, the process of choosing which variables to include in a toxicology analysis is a very complex task. Drawing on a previous team's experience of including the wrong variables increases the likelihood of a team to succeed in choosing the right ones. (c) Application allowed the team to turn to experienced others to help it learn how to use important technologies (3.50, 2.33). An example of this process was captured in the earlier description of how the Alpha team demonstrated to the Beta team how to use a piece of equipment for toxicology tests. (d) Application allowed the team to copy practices used by others exactly (4.88, 1.73). This may include the use of exact checklists for evaluating a drug developed by a previous team, or the use of specific deal structures for licensing agreements. (e) Application allowed the team to extract lessons that it could adapt and then apply to its task (5.88, 1.36). Some tasks have little leeway for improvisation, such as operating a piece of equipment, but in many tasks sub-skills have to be improvised to fit various circumstances. For example, a team may extract concepts that are common between a task they learn from and their own specific circumstances. Based on these concepts they may then formulate rules and develop skills that they can apply to their own task. This way a team may acquire judgmental standards, negotiating styles, and information processing procedures. One observation from these very limited data is that the notions of skipping steps and avoiding repetition of mistakes are closely related (no rater separated the two with more than one point.) Perhaps the most interesting observation is that the application process rated most highly requires the highest level of abstraction and adaptation. This points to the notion of vicarious learning as associated primarily

with complex know-how, rather than simple know-what, which was reinforced by the answers to my final set of questions.

Third, and lastly, team leaders were asked about the extent to which learning from experienced others involved different knowledge types. Again, short descriptions are followed by average ratings and standard deviations: (a) "know-how," e.g. how to run experiments or negotiations (6.00, 1.06); (b) "know-what," e.g. data from past experiments or negotiations (4.63, 1.59); (c) "know-who," knowledge related to finding someone with relevant expertise (5.63, 1.51). This very preliminary evidence points to the importance of know-how, but also know-who, in vicarious team learning. More codified information, know-what, appears to be less prominent (in line with the theorizing associated with the formulation of H1.) Notably, know-how was rated the highest, or shared the highest rating, from six of the eight raters.

DISCUSSION

In all, this research shows the usefulness of vicarious learning as a means to understand team-learning processes. Others have pointed to its importance, but until now we have not systematically examined the specific behaviors involved in vicarious team learning – activities that allow a team to learn how to do key aspects of its task from the similar experiences of others outside the team. This work identifies a range of these behaviors, which include figuring out whom to contact for advice about how to get the job done, observing outsiders working on similar tasks to extract applicable lessons, and inviting experienced others to discuss how to avoid repeating past mistakes.

The research also shows that vicarious team learning behavior is theoretically and empirically different from the behavior involved in other kinds of team learning. It is different from *experiential* learning behavior (such as seeking feedback, asking questions, and experimenting inside the team), which allows the team to learn how to do its tasks based on members' direct experience. It is also different from *contextual* learning behavior (such as finding out what competing teams are doing), which allows the team to learn what its task environment looks like. Finally, this research finds that vicarious team learning behavior is positively related to team performance when analyzed jointly with other team learning types.

This work builds on recent work on external learning activities in teams (Argote et al., 2000a; Haas & Hansen, 2005; Wong, 2004; Zellmer-Bruhn, 2003), and answers Edmondson's

(2002) call for more research on the intersection between learning and boundary processes in teams. A better understanding of how teams learn vicariously help us better understand how teams learn in general, since partitioning team learning into separate types allows us to examine their antecedents, moderators and outcomes separately. The data presented here further suggest that different kinds of team learning have different pathways to performance. This indicates that by theorizing about how different kinds of team learning matter differently, we can reach a better understanding of how team learning influences performance.

Limitations

The exploratory nature of this study limits its findings. Its aim was to develop rather than test theory. Although statistical tests were conducted, these were based on a small sample. The statistical findings should not be seen as definite proof and should be considered jointly with the qualitative evidence presented here. Further research involving larger data sets and other settings would be helpful to establish the construct more firmly. Another limitation of this study is its retrospective component. The steps taken to mitigate and test for bias notwithstanding, further research should seek to replicate the findings of this study in a setting in which retrospective bias is not an issue.

Theoretical Extensions and Directions for Future Research

The research presented here was exploratory and more work is needed before its implications can be fully understood. In conclusion, this section discusses a number of theoretical extensions suggested by this research, and a research agenda designed to explore them.

Vicarious team learning has conceptual and empirical relationships with other learning constructs that are not explored here. Quantitative as well as qualitative data suggest that all three sets of learning behavior investigated here should be seen as co-existing processes rather than as mutually exclusive. As the work of Wong (2004) shows, the nature of co-existence of team learning types is important to understanding team learning. For example, Wong showed that external learning behavior can impede the efficiency effects of experiential team learning. One question raised by this paper is whether effective vicarious learning behavior presumes a functional experiential learning process. In other words, is it only when the team has learned

experientially what it does not know that it can home in on what experiences members need to seek out through vicarious learning? Or does it work the other way around? Although they acknowledge the ambiguities in causal direction, Bunderson and Sutcliffe (2002) suggest that boundary spanning is an antecedent to learning behavior in the team. Brought into the context of vicarious team learning, this might suggest that it is only when the team has learned from others what to focus on that it can effectively engage in experiential learning. The reality, most likely, is somewhere in-between, and may change over the life of the team.

The apparent positive performance effects leads one to question why not all teams engage in vicarious learning behavior. Interviews with team leaders indicate that different levels of vicarious learning behavior among the studied teams were partly due to motivational factors (cf. Katz & Allen, 1982), but that ability was the most important factor. Team member interviews indicate that teams would have liked to learn vicariously, but they often lacked the ability. The ability to learn vicariously involves the ability to recognize the right experiences to learn from, the ability to translate the experiences of others into a language spanning boundaries, and the ability to convert language into application of others' experiences in the relevant context. This is difficult and involves the risk of learning the wrong things. For example, in their work on habitual routines, Gersick and Hackman (1990) showed that teams sometimes run the risk of harmful learning. Interestingly, the data do not suggest evidence of teams learning the wrong lessons or "superstitious learning" (e.g., Levitt & March, 1988). If that were a prevalent effect, after all, vicarious learning would not be a significant predictor of performance. While the data do not lend themselves to systematic analysis, they provide some hints. Interview data indicate that if a team was not reasonably sure that expending the effort to engage in vicarious learning behavior would be productive, its members would not attempt it. Perhaps this is because in a time-pressured environment with complex task interdependencies both search and transfer costs may simply be too high (Hansen, 1999; Hansen, Mors & Lovas, 2005). Another observation consistent with this notion is that teams tended to learn from teams that had already completed their tasks, rather than from teams still in the process of completing their task. This way a "proof of concept," as one interviewee put it, was available and causal ambiguity could be minimized (Szulanski, Cappetta, & Jensen, 2004). These thoughts are speculation at this point, however, and there is much more empirical and theoretical work to be done related to risks of learning the wrong lessons and superstitious learning in general at the team level.

The interview data further suggest at least two causes for lacking vicarious learning ability. First, in order for a team to learn vicariously, teams and individuals with relevant task specific experiences have to exist in its task environment. Second, in order to leverage these experiences, the team needs a context with supportive structures and procedures. Components of this support environment may be quite elaborate — such as an advanced information infrastructure with databases set up for the specific purpose of passing on task experiences — but they may also be as simple as a manager encouraging experienced teams or team members to spend time sharing experiences with less experienced teams. These observations about antecedents are highly speculative though. Further research is needed to identify possible sources of variance in vicarious learning behavior among teams and to investigate them empirically.

The current sample contained little or no overlap in team membership among teams. Yet, overlap in the membership of teams may be beneficial if members can transfer task experiences gained from one team to another that way (Kane, Argote, & Levine, 2005). To the extent this rotation among teams occurs, it should influence team learning behavior. For example, if members with comprehensive and detailed task experiences from one team move on to another team in which those experiences are highly applicable, then the need for vicarious learning behavior should go down dramatically. Further research is needed to understand the effects that transfer of team members between teams has on team learning behavior.

The in-licensing teams studied here embody many of the characteristics of teams operating in today's fast-paced environment. Nevertheless, limiting the study to a particular kind of team in one industry means that generalizations to other types of teams in other kinds of settings should be made only cautiously. Though the research foci are different, it is notable that the distinction between vicarious and contextual learning behavior found important here is not immediately evident in some other work highlighting external team learning behavior. This is in all likelihood due to differences among the studied contexts. Previous studies have focused on teams with relatively high levels of internal task experience (Wong, 2004; Zellmer-Bruhn, 2003), which may have diminished the need for vicarious learning and blurred the distinction with contextual learning. This study reported on a set of teams with little internal task experience. The observation points to the important question of the boundary conditions of this study – the conditions under which its findings hold. A relatively low level of internal task experience is in all likelihood one such condition. This conjecture is supported by Haas and Hansen's (2005)

finding that the performance of highly experienced consulting teams suffered from engaging in extensive external learning behavior. Other important boundary conditions may be team type and task type. This study involved time-limited project teams working on knowledge-intensive product development tasks. Other studies have focused on less technology-oriented continuous teams (Bunderson & Sutcliffe, 2002; 2003; Wong, 2004; Zellmer-Bruhn, 2005), conditions which may leave vicarious team learning behavior less pronounced. A careful conceptualization and testing of moderators and mediators of vicarious learning behavior is an important task for team learning researchers.

Conclusion

Vicarious learning has been extensively researched at the individual and organizational levels. This paper begins to bring vicarious learning into the team literature and provides evidence of how vicarious learning operates at the team level. Using both qualitative and quantitative data, it describes vicarious team learning behavior, shows how it is different from other kinds of team learning behavior delineated in the literature, and presents evidence that vicarious team learning behavior is positively associated with team performance. Hence, this research sheds light on a hitherto under-explored dimension of how teams learn and what makes them effective. Importantly, this is an exploratory study. As such, the paper lays out a research agenda establishing concrete next steps toward understanding vicarious learning more fully as an integral part of how teams learn.

REFERENCES

Aitken, M., Lamarre, E., & Silber, M. (1998). Winning in Rx licensing. In Vivo, September.

Allen, T. J. (1977). Managing the flow of technology: Technology transfer and the dissemination of technological information within the R&D organization. Cambridge, MA: MIT Press.

Allen, T. J. & Cohen, S. I. (1969). Information flows in research and development laboratories. Administrative Science Quarterly, 14, 12-19.

Ancona, D. G. & Bresman, H. (2005). Begging, borrowing and building on ideas from the outside to create pulsed innovation inside teams. In L.Thompson & H.-S. Choi (Eds.), Creativity and innovation in organizational teams (pp. 183-198). Mahwah, NJ: Lawrence Erlbaum.

Ancona, D. G., Bresman, H., & Kaeufer, K. (2002). The comparative advantage of X-teams. Sloan Management Review, 43, 33-39.

Ancona, D. G. & Caldwell, D. F. (1992). Bridging the boundary: External activity and performance in organizational teams. Administrative Science Quarterly, 37, 634-665.

Argote, L., Gruenfeld, D. H., & Naquin, C. (2000a). Group learning in organizations. In M.E.Turner (Ed.), Groups at work: Theory and research (pp. 369-411). New York: Erlbaum.

Argote, L. & Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in firms. Organizational Behavior and Human Decision Processes, 82, 150-169.

Argote, L., Ingram, P., Levine, J. M., & Moreland, R. L. (2000b). Knowledge transfer in organizations: Learning from the experiences of others. Organizational Behavior and Human Decision Processes, 82, 1-8.

Argyris, C. & Schon, D. (1978). Organizational Learning: A Theory of Action Perspective. Addison-Wesley.

Austin, J. R. (2003). Transactive memory in organizational groups: The effects of content, consensus, specialization, and accuracy on group performance. Journal of Applied Psychology, 88, 866-878.

Balzer, W. K. & Sulsky, L. M. (1992). Halo and performance appraisal research: A critical examination. Journal of Applied Psychology, 77, 975-985.

Bandura, A. (1977). Social learning theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1989). Social cognitive theory. In R.Vasta (Ed.), Annals of child development (pp. 1-60). Greenwich, CT: JAI Press.

Bandura, A. & Walters, R. H. (1963). Social learning and personality development. New York: Holt, Rinehart and Winston.

Baum, J. A. C., Xiao Li, S., & Usher, J. M. (2000). Making the next move: How experiential and vicarious learning shape the locations of chains' acquisitions. Administrative Science Quarterly, 45, 766-801.

Brown, J. S. & Duguid, P. (1991). Organizational learning and communities of practice. Organization Science, 2, 40-57.

Brown, S. L. & Eisenhardt, K. M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. Administrative Science Quarterly, 42, 1-34.

Bunderson, J. S. & Sutcliffe, K. M. (2002). Why some teams emphasize learning more than others: Evidence from business unit management teams. In E.A.Mannix & H. Sondak (Eds.), Research on managing groups and teams (4 ed., pp. 49-84). New York: Elsevier Science.

Bunderson, J. S. & Sutcliffe, K. M. (2003). Management team learning orientation and business unit performance. Journal of Applied Psychology, 88, 552-560.

Cox, R., McKendree, J., Tobin, R., Lee, J., & Mayes, T. (1999). Vicarious learning from dialogue and discourse: a controlled comparison. Instructional Science, 27, 431-458.

Cummings, J. N. (2004). Work groups, structural diversity, and knowledge sharing in a global organization. Management Science, 50, 352-364.

Darr, E. D., Argote, L., & Epple, D. (1995). The acquisition, transfer, and depreciation of knowledge in service organizations: Productivity in franchises. Management Science, 41, 1750-1762.

Davis, T. R. V. & Luthans, F. (1980). A social learning approach to organizational behavior. Academy of Management Review, 5, 281-290.

Denrell, J. (2003). Vicarious learning, under-sampling of failure, and the myths of management. Organization Science, 14, 227-243.

DeVellis, R. F. (1991). Scale development. Newbury Park, CA: Sage.

Douglas, M. (1986). How institutions think. Syracuse, NY: Syracuse University Press.

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. Administrative Science Quarterly, 44, 350-383.

Edmondson, A. C. (2002). The local and variegated nature of learning in organizations: A group-level perspective. Organization Science, 13, 128-146.

Edmondson, A. C., Winslow, A. B., Bohmer, R. M., & Pisano, G. P. (2003). Learning how and learning what: Effects of tacit and codified knowledge on performance improvement following technology adoption. Decision Sciences, 34, 197-223.

Eisenhardt, K. M. (1989). Building theories from case study research. Academy of Management Review, 14, 532-550.

Elder, G. H. (1971). Racial learning and conflict. Sociometry, 34, 151-173.

Epple, D., Argote, L., & Devadas, R. (1991). Organizational learning curves: A method for investigating intra-plant transfer of knowledge acquired through learning by doing. Organization Science, 2, 558-570.

Faraj, S. & Sproull, L. S. (2000). Coordinating expertise in software development teams. Management Science, 46, 1554-1568.

Freeman, L. & Romney, A. (1987). Words, deeds, and social structure: A preliminary study of the reliability of informants. Human Organization, 46, 330-334.

Gersick, C. J. G. & Hackman, J. R. (1990). Habitual routines in task-performing groups. Organizational Behavior and Human Decision Processes, 47, 65-97.

Gibson, C. & Vermeulen, F. (2003). A healthy divide: Subgroups as a stimulus for team learning behavior. Administrative Science Quarterly, 48, 202-239.

Gioia, D. A. & Manz, C. C. (1985). Linking cognition and behavior: A script processing interpretation of vicarious learning. Academy of Management Review, 10, 527-539.

Glick, W. H. (1985). Conceptualizing and measuring organizational and psychological climate: Pitfalls in multilevel research. Academy of Management Review, 10, 601-616.

Guinan, P. J., Cooprider, J. G., & Faraj, S. (1998). Enabling software development team performance during requirements definition: A behavioral versus technical approach. Information Systems Research, 9, 101-125.

Haas, M. R. & Hansen, M. T. (2005). When using knowledge can hurt performance: The value of organizational capabilities in a management consulting company. Strategic Management Journal, 26, 1-24.

Hackman, J. R. (1987). The design of work teams. In J.W.Lorsch (Ed.), Handbook of organizational behavior (pp. 315-342). Englewood Cliffs, NJ: Prentice Hall.

Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. Administrative Science Quarterly, 44, 82-111.

Hansen, M. T., Mors, M. L., & Lovas, B. (2005). Knowledge sharing in organizations: Multiple networks, multiple phases. Academy of Management Journal, 48, 776-793.

Haunschild, P. R. & Miner, A. S. (1997). Modes of interorganizational imitation: The effects of outcome salience and uncertainty. Administrative Science Quarterly, 42, 472-500.

Hauptman, O. (1986). The influence of task type on the relation between communication and performance: The case of software development. R & D Management, 6, 218-244.

Henderson, J. C. & Lee, S. (1992). Managing I/S design teams: A control theories perspective. Management Science, 38, 757-777.

Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. Organizational Research Methods, 1, 104-121.

Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. Organization Science, 2, 88-115.

Hunt, R. G. (1968). Review of E.J. Miller and K.A. Rice's systems of organization. Administrative Science Quarterly, 13, 360-362.

Ingram, P. & Simons, T. (2002). The transfer of experience in groups of organizations: Implications for performance and competition. Management Science, 48, 1517-1533.

Jehn, K. A. (1997). A qualitative analysis of conflict types and dimensions in organizational groups. Administrative Science Quarterly, 42, 530-557.

Kane, A., Argote, L., & Levine, J. M. (2005). Knowledge transfer between groups via personnel rotation: Effects of social identity and knowledge quality. Organizational Behavior and Human Decision Processes, 96, 56-71.

Katz, R. & Allen, T. J. (1982). Investigating the Not Invented Here (NIH) syndrome: A look at the performance, tenure, and communication patterns of 50 R&D project groups. R & D Management, 12, 7-19.

Kenny, D. A. & La Voie, L. (1985). Separating individual and group effects. Journal of Personality and Social Psychology, 48, 339-348.

Levitt, B. & March, J. G. (1988). Organizational learning. In W.R.Scott & J. F. Short (Eds.), (14 ed., pp. 319-340). Palo Alto. CA: Annual Reviews.

Lewis, K. (2003). Measuring transactive memory systems in the field: Scale development and validation. Journal of Applied Psychology, 88, 587-604.

Libby, R. & Blashfield, R. K. (1978). Performance of a composite as a function of the number of judges. Organizational Behavior and Human Performance, 21, 121-129.

Longman, R. (2001). The search for certainty: Trends in early- and late-stage dealmaking. In Vivo 19-30.

MacCormack, A., Verganti, R., & Iansiti, M. (2001). Developing products on 'Internet time': The anatomy of a flexible development process. Management Science, 47, 133-150.

Manz, C. C. & Sims, H. P., Jr. (1981). Vicarious learning: The influence of modeling on organizational behavior. Academy of Management Review, 6, 105-113.

Moreland, R. L. (1999). Transactive memory: Learning who knows what in work groups and organizations. In L.L.Thompson, J. M. Levine, & D. M. Messick (Eds.), Shared cognition in organizations: The management of knowledge (pp. 3-31). Mahwah, NJ: Lawrence Erlbaum Associates.

Nemeth, C. J. (1986). Differential contributions of majority and minority influence. Psychological Review, 93, 23-32.

Nunnally, J. C. (1967). Psychometric theory. New York: McGraw-Hill.

Pisano, G. P. (1996). Learning before doing in the Development of New Process technology. Research Policy, 25, 1097-1119.

Pitcher, B. L., Hamblin, R. L., & Miller, J. L. L. (1978). The diffusion of collective violence. American Sociological Review, 43, 23-35.

Rosenthal, T. L. & Zimmerman, B. J. (1978). Social learning and cognition. New York: Academic Press.

Shrout, P. E. & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. Psychological Bulletin, 86, 420-428.

Sobrero, M. & Roberts, E. B. (2001). The trade-off between efficiency and learning in inter-organizational relationships for product development. Management Science, 47, 493-511.

Stasser, G. (1992). Information salience and the discovery of hidden profiles by decision making groups: A 'thought' experiment. Organizational Behavior and Human Decision Processes, 52, 156-181.

Staw, B. M. (1975). Attribution of the "causes" of performance: A general alternative interpretation of cross-sectional research on organizations. Organizational Behavior and Human Performance, 13, 414-432.

Szulanski, G. (1996). Exploring internal stickiness: impediments to the transfer of best practice within the firm. Strategic Management Journal, 17, 27-43.

Szulanski, G. (2000). The process of knowledge transfer: A diachronic analysis of stickiness. Organizational Behavior and Human Decision Processes, 82, 9-27.

Szulanski, G., Cappetta, R., & Jensen, R. J. (2004). When and how trustworthiness matters: Knowledge transfer and the moderating effect of causal ambiguity. Organization Science, 15, 600-613.

Tushman, M. L. (1977). Special boundary roles in the innovation process. Administrative Science Quarterly, 22, 587-605.

Tushman, M. L. & Nadler, D. A. (1979). Information processing as an integrative concept in organizational design. In D.A.Nadler & M. L. Tushman (Eds.), Managerial Behavior (pp. 157-190). New York: Columbia University Press.

Tyre, M. J. & von Hippel, E. (1997). The Situated Nature of Adaptive Learning in Organizations. Organization Science, 8, 71-83.

von Hippel, E. (1994). 'Sticky information' and the locus of problem solving: Implications for innovation. Management Science, 40.

von Hippel, E. & Tyre, M. J. (1995). How learning by doing is done: problem identification in novel process equipment. Research Policy, 24, 1-12.

Wegner, D. W. (1987). Transactive memory: A contemporary analysis of the group mind. In B.Mullen & G. R. Goethals (Eds.), Theories of group behavior (pp. 185-208). New York: Springer-Verlag.

Wong, S.-S. (2004). Distal and local group learning: Performance trade-offs and tensions. Organization Science, 15, 645-656.

Yin, R. K. (1989). Case study research: Design and methods. London: Sage.

Zellmer-Bruhn, M. (2003). Interruptive events and team knowledge acquisition. Management Science, 49, 514-528.

Table 1.

Team	Therapeutic area	Phase of * development	Duration ** (months)	Members per team	Interviews *** per team
Alpha	Infectious diseases	Phase III	10 (June Year 1-March Year 2)	12	9
Beta	Infectious diseases	Phase III	12 (Dec Year 1-Nov Year 2)	14	12
Gamma	Infectious diseases	Phase III	5 (Dec Year 2-April Year 3)	12	11
Delta	Oncology	Phase III	10 (June Year 1-March Year 2)	11	9
Epsilon	Oncology	Phase II	12 (Dec Year 1-Nov Year 2)	8	8
Sigma	Oncology	Phase III	5 (Dec Year 2-April Year 3)	9	9

* The phases of drug development:
Pre-clinical: Trials with the goal to gather sufficient data on the candidate drug to warrant the step into clinical trials.
Phase I: Clinical trials with healthy volunteers. Focus on safety.
Phase II: Clinical trials with afflicted patients. Focus on efficacy.
Phase III: Large scale trials with the goal to find proof of efficacy and safety in long-term use.
Approval: Documentation submitted to the authority responsible for drug approval.
** The exact years during which the projects took place have been disguised at the request of Pharmaco.
*** Not including numerous phone calls and follow-up conversations.

Table 2.

Vicarious Team Learning Behavior	
Activity *	Example
Going out to gather information regarding who to contact for advice about how to complete the task	"We still found that we had a need for input on supply before our site visit… so we spent some time figuring out who out there [in the organization] had done this kind of thing before… [So that] we could go to them and ask for their advice about how to do our estimation." "So we decided to try to find good practices in pharmacokinetics, and there are some guys around here who have done that in [similar] projects before…We wanted to contact them to ask questions about how to do [the task], but didn't know where to find them. We asked around... and we went out and found them."
Observing the work of others outside the team to extract lessons to be applied to the task	"To have the chance to actually watch those who are doing similar [work in the lab] is gold. Some things are very difficult to describe in words… You learn lessons you wouldn't have otherwise and you can really use them when you start working on your own [task]. You can start at a whole other level." "We were given the instrumentation used by a previous team, and guys from that team… took time to show us how to use the equipment… This is something of an art."
Inviting people from outside the team to discuss how to avoid repeating past mistakes	"We realized that we didn't have a handle on quality assurance… we ended up inviting these guys over who had been on a team that had also looked at [a similar molecule]… The team learned a lot from those guys… about how to do this, and about how to avoid doing things they told us they shouldn't have done." "You go down the hallway and you hear someone saying something and you go 'Oh my god, we did not even realize'… and then you ask him to come over and share what he did when he was in the trenches… how they completed their project and the mistakes that they had made. Because you don't want to repeat those mistakes."
Talking to people outside the team about past failures to determine ways of improving the work process	"We needed a good road map for how to do the valuation and so I decided to talk to some old friends of mine… they walked us through how they had done it… We talked about where they had failed and how we could make our process work more effectively." "It was best when people from [an experienced] team came over so that we were together in the lab fiddling with the system. If they had just sent over their specs, chances are nothing would have happened. But now we could talk directly about their failures and how we could improve on what they had done."
Reflecting on what has worked in the past together with people outside the team with experience from similar tasks	"This [lack of experience] spurs creative search that will hopefully give you a proxy… You have to go out to put the puzzle pieces together, like a detective… to talk to people who have done it before who can help you do that… You talk about what they did right and about how this can help you, or maybe can't help you, with the challenges your team is facing." And then [when members from an experienced team are with you in the lab], they say 'this is what worked for us,' and we say 'can't do that because of this,' 'OK then' they say, 'but then we can change this thing over here, then it will work for you too'."
Gathering data on how to do the task generated by past teams	"The team before us had developed this check list of criteria to use when evaluating the proprietary position of a compound [of the same class]. It was great. We used a copy of that list." "The most important thing you can learn from other teams is what questions to ask… They handed down an entire binder of critical questions organized by discipline."
* Note that the aspects of vicarious learning behavior listed here should not be seen as independent constructs, but as overlapping activities. These activities are reflected in the questionnaire items used to measure the vicarious team learning behavior construct in this study (see Table 6.)	

Table 3.

	Boundary Spanning	Search Modality	Knowledge Type
Experiential Learning	No	Specific	Know-How
Contextual Learning	Yes	General	Know-What
Vicarious Learning	Yes	Specific	Know-How

Table 4.

Intercorrelations between Variables									
Variables	Mean	S.D.	1	2	3	4	5	6	7
1 Vicarious Learning Behavior	4.21	1.30							
2 Experiential Learning Behavior	4.91	0.91	.49						
3 Contextual Learning Behavior	5.12	1.14	.48	.45					
4 Experience	3.50	1.03	.22	(-.14)	(.17)				
5 Resources	4.20	0.98	(.10)	(.17)	.2	.26			
6 Team Size	5.35	1.13	(.05)	(.08)	(.12)	(-.06)	(.09)		
7 Team Duration	10.5	6.00	(-.07)	(.04)	(.14)	(.02)	-.25	(.01)	
8 Performance	4.34	1.28	.46	.36	.37	.38	(.16)	(-.02)	(-.15)
Correlations in parentheses not significant at p > .05, all other correlations are significant at p < .05.									

Table 5.

Intraclass Correlation Coefficients for Reflective Scales	
Team Members (*N* = 122)	ICC
Vicarious Learning Behavior	.71***
Experiential Learning Behavior	.60***
Contextual Learning Behavior	.64***
Resources	.61***
External Raters (*N* = 90)	
Performance	.85***

** p< .05 ; *** p < .01

Table 6.

Factor Loadings for Team Learning Dimensions (*N* = 122)			
Item	1	2	3
Vicarious Learning Behavior			
Going out to gather information regarding who to contact for advice about how to complete the task	**.58**	.05	.25
Observing the work of others outside the team to extract lessons to be applied to the task	**.52**	.12	.32
Inviting people from outside the team to discuss how to avoid repeating past mistakes	**.72**	.18	.07
Talking to people outside the team about past failures to determine ways of improving the work process	**.77**	.21	.08
Reflecting on what has worked in the past together with people outside the team with experience from similar tasks	**.75**	.18	.12
Gathering data on how to do the task generated by past teams	**.64**	.18	.22
Experiential Learning Behavior			
Taking time to figure out ways to improve the work process	.09	**.77**	.01
Reflecting on the team's work progress	.12	**.58**	.32
Speaking up to test assumptions about issues under discussion	.24	**.82**	.06
Identifying new information leading to changes	.30	**.45**	.28
Handle differences of opinion privately or off-line	.14	**.56**	.26
Contextual Learning Behavior			
Finding out what competing firms or teams are doing on similar projects	.19	.18	**.73**
Scanning the environment inside or outside the organization for marketing ideas/expertise	.02	.03	**.81**
Collecting technical information/ideas from individuals outside the team	.20	.29	**.65**
Scanning the environment inside or outside the organization for technical ideas/expertise	.18	.05	**.76**

Table 7.

Experiential Team Learning	*Contextual Team Learning*	*Vicarious Team Learning*
We sat down with an empty sheet of paper to pool our knowledge about what we should do to make this work… How do you build this thing? Our only strategy was to have the world's coolest drug. It was up to us to design a process that would take us there based on what we had done before	We needed to get a general sense of... who our competitors had been in touch with, who they had bought from, how much they had paid, where they were in the process… It was benchmarking and making sure that we didn't start to develop a drug that someone else was already well on their way to develop.	Parallel to our internal team process we tried to find out what other teams had done working on similar drugs. We interviewed people who had been members of those teams… asked what did they think had gone well, what did they think had not gone well, what they could have done better. Then, together with them, we tried to figure out the difference between their experiences and our situation, to assess what was relevant and what wasn't relevant. For example, they had spent a lot of time on issues of early clinical development. This was not so relevant for us. We also had many more potential [uses for] our drug. But a lot of what they said was directly applicable, and a lot of what they had learned about how to do their task was applicable to some extent.
The tough challenge was to figure out how to integrate the different parts… technology, marketing, financial analysis. There was a lot of back and forth in the team… trying to figure out and learn how this was done.	We did very little research on what other firms were doing. Too little. Typical of this firm. We cared about what other teams in our own organization were doing, but not about potential competitors elsewhere… That came back to bite us.	We developed a skeleton of how we thought we might do it, then we started to walk around with this skeleton and knock on people's doors, people who had done it before, to have them "squeeze" it, to hear what they thought. This was a way we could bring their experience to bear, use what they had learned when working on similar tasks.
The internal [team] process was about getting our ideas on the table… How do we identify [drugs] that fit our needs? Through this process of combining our ideas and experiences we constructed a framework… But at first the criteria were too generous and we generated too many leads. So we had to raise the bar. After a few more iterations we got it right.	Do your own thing, but it is important to be conscious about the environment in which you operate. We sniffed around quite a bit, and clearly, we ended up discarding [some drugs] and looking more closely at others as a direct result of what we found while sniffing around… What competitors were up to.	We had these experienced people who had been involved in a project a few years ago with a drug of the same class, and we started an advisory group. They felt a certain loyalty since they had gone through similar things. There was clearly a factor of nostalgia there on their part. .. They demonstrated a lot of the things we needed to do in the lab so we could observe them work… They shared the mistakes they felt they had made and told us what they would have done differently and how they thought we could work on our project more effectively.
As a team leader it is great to have members who know more than you do about the technology. Then you can combine that expertise with my helicopter view of the process and when combined the results can be amazing.	It was a bit of a leap and we did not know this market well. We identified an external guy who mapped the market for us… What kind of market is it? What do customers demand? We needed to know the target population to know whether it was worth it to figure out how to evaluate and develop the drug.	
You really need to reflect on what you are doing as a team… You can't just copy-paste from your past experiences but adjust to the circumstances. This takes additional experimentation and trial and error. I don't want people who just do copy-paste on my team. They make me scared. A team needs active reflection.	Deregulation made it possible to enter [the market]. But the same deregulation made it possible for our competitors to enter too. New players would come in and be part of the game, we just did not know who yet… We built an intelligence database with general information about our potential competitors. Mainly public information, but there is a lot of gossip going on at conferences and we used that too.	
There could have been more exchange and learning in the team. Members complained about this. That individuals learned a lot but it wasn't leveraged. Then, someone leaves the team and it's gone.		

Table 8.

Regression Models of Team Performance (*N* = 43)							
	1	2	3	4	5	6	7
Experience	.48***	.33**	.40***	.43***	.33**	.33**	.34**
Resources	.33**	.28**	.28**	.27*	.26*	.27*	.27*
Vicarious Learning Behavior		.42***			.29**	.30**	.35**
Experiential Learning Behavior			.54***		.28*	.30*	
Contextual Learning Behavior				.37***	.03		.13
R^2 (within)	.22	.30	.26	.24	.34	.33	.31

* p < .1 ; ** p< .05 ; *** p < .01

APPENDIX: MITIGATING AND TESTING FOR RETROSPECTIVE BIAS

The risks of substantial delays as well as informants leaving and firms being reconstituted during the course of a project are quite high in the turbulent pharmaceutical industry. An important advantage of a retrospective design, therefore, was that data collection was less vulnerable to disruptions and delays. Since measures in this research depend on team member responses, a concern of the retrospective design is that it may involve recall problems — respondents may forget past events. This issue is important to recognize, but should not be a serious concern in this study. Research has shown that when recall inaccuracies exist they are biased toward the mean, and are unlikely to result in "false positives" (Freeman & Romney, 1987). That is, recall problems may cause us to reject a hypothesis that is true, but they are unlikely to cause us to accept a false hypothesis. A related issue is halo error, that is, the risk that general feelings about the outcome of a process may color judgment of the process itself. Reviews have revealed inconclusive evidence on halo effects (Balzer & Sulsky, 1992). More specifically, research on teams suggests that retrospective judgments related to the quality of behavior (e.g., quality of communication) may be affected by halo, whereas retrospective judgments related to the amount of behavior (e.g., quantity of communication) are not significantly affected by halo – even if knowledge of outcome is shared among team members (Staw, 1975; Haas & Hansen, 2005).

Nevertheless, several steps were taken to mitigate test for retrospective bias. First, data were collected prior to market launch, before an organization-wide consensus about project outcome had had the chance to take hold. Second, the team questionnaire was designed to minimize risks of halo effects. The introduction stated that the purpose of the questionnaire was to better understand team process. Respondents were not asked to assess the outcome of the project. Furthermore, respondents were asked to assess frequencies and kinds of behaviors rather than their perceived quality. Finally, I gained access to folders of email correspondence pertaining to four of the 43 teams. These records, produced in real time in one firm, were obtained opportunistically. The records included only emails involving the team leaders, and they covered all aspects of the projects, not aspects of learning specifically. Therefore, these accounts of learning activities should not be viewed as comprehensive. Nevertheless, they can be used for triangulation. I counted all references to team learning behavior in the email correspondence. A research assistant then independently repeated the exercise. As shown in the Table below, retrospective responses assessing vicarious team learning behavior correspond well with the archival records. This supports the view that while it should be thoughtfully considered, the retrospective component of the research design does not carry significant risks of accepting hypotheses that should be rejected.

Retrospective Self-Reports v. Archival Records: The Case of Vicarious Team Learning

	Self-report		Archival records	
	Score *	Rank	References **	Rank
Team 1	5.9	1	13 (10) ***	1
Team 2	5.1	2	7 (7)	2
Team 3	4.3	3	5 (4)	3
Team 4	2.8	4	0 (0)	4

* Team level score from six-item scale (rated from 1 = "strongly disagree" to 7 = "strongly agree") measuring vicarious team learning. Details in methods section.

** Number of references to vicarious team learning activities in team leaders' email correspondence.

*** Research assistant's independent count

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