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An Integrated Perspective: Applying Team Learning and Knowledge Creation through Team Learner Styles

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Abstract

Research in the field of organizational and team learning is well documented with several notable theories explaining the components and process. However, after thorough examination of the literature, there is an obvious disconnect between theoretical understanding and organizational application. The focus of this research is to develop an applied framework for team learning and knowledge creation by integrating three currently recognized theoretical models. The three models incorporated are Boisot's Social Learning Cycle Model (SLC), Kolb's Learning Style Inventory Model (LSI) and Lee's Modes of Learning Progression Model (MLP). These three models are selected because they provide the primary dimensions, in tandem, required for the construction of the newly applied framework. This resulting Team Learner Style Quadrant (TLSQ) framework suggests that specific learning styles suits the various stages in the learning process of teams that are charged with different roles for team learning and knowledge creation and can be easily applied to any organization. Finally, propositions of knowledge diffusion are provided for framework validity, providing researchers with a direction for future hypotheses and model development.

Keywords: team learning, organizational learning, learning progression, learner style, knowledge creation, knowledge diffusion.

INTRODUCTION

Applying team learning strategies towards the enhancement of organizational absorptive capacity (Cohen, 1989) and productivity is an increasingly vital concern for both organizational theorists and global managers. Argote et al. (2000) and Szulanski (1996, 2000) emphasized the importance of understanding knowledge transfer at the intra-firm level. Hong and Vai (2008) further enriched the debate by showing how the learning climate, job rotation, coaching, and shared understanding can contribute to knowledge sharing in cross-functional virtual teams. However, research is still vague on how team members absorb and share knowledge throughout a team's knowledge creation process.

In recent years, researchers have identified the importance of sub-groups/sub-teams in team effectiveness. For instance, literature has confirmed the significance of pairing sub-teams for enhancing team learning (Gibson and Vermeulen, 2003; Ellis, Hollenbeck, Ilgen, Porter, West, Moon, 2003). Yet, these theories describe very general sub-team optimal productivity without adequate emphasis on the sub-team roles in team learning and knowledge creation. Moreover, the literature still appears to be lacking in providing an understanding of the nature and combination of sub-teams that are effective for enhancing the team learning and knowledge creation process. This deficiency is problematic because the existing theories are too broad and encompassing. In fact, this current understanding of team learning and knowledge diffusion is bounded with limited consideration for the stages of team development as well as team member characteristics.

Gersick (1988) shed insight on the concept of "punctuated equilibrium," which suggested half-time urgency as a motivator for speeding up team productivity. Yet, the understanding of the evolving nature of sub-team member combination for optimal team learning and knowledge diffusion over the different team development stages remains limited (Lee, Ridzi, Lo, Coskun, 2011). This is important because team functioning differs across varying stages of team development (DeRue and Rosso, 2009). We argue that a team's efficiency in knowledge creation is connected to the placement of sub-team members with different learner styles at different stages of the team's development. It is important to understand how team members infuse, record, utilize and share knowledge because of the increasing prominence of knowledge workers and virtual teams, where the majority of a firm's value creation lies in the effective management and utilization of knowledge (Oguntebi, 2009; Lewis, 2004; Kirkman et al., 2004).

This research study is therefore driven by the following research question: "*Which team member learner styles will best facilitate team learning and knowledge creation in an information development process?*" Understanding that existing team

development theories mostly focus on change of team member dynamics over time is a critical realization (Tuckman, 1965; Gersick, 1988). However, the focus here is on the evolving nature of information in the knowledge diffusion process of a team. Also, literature suggests that team members should adapt to the changing team needs (Burke, Stagl, Salas, Pierce, and Kendall, 2006); however, it is argued that this approach is too passive. Team members should be proactively placed at different stages of team development based on their learner styles to facilitate effective knowledge creation.

One objective of this paper is to offer a contingency analysis of how the team member learner style fits with the information evolution and knowledge development of the team to optimize team learning and knowledge creation. Consistent with prior research, this work conceptualizes *team learning* as "an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions" (Edmondson 1999:354). *Learner style* is delineated based on preference for information intake and interpretation (Kolb, 1984). The respective styles will be in subsequent sections.

Four key assumptions of this research should be noted. First, task interdependence is assumed to exist among team members as they work towards their objectives (Franz, 1998; Vliert, Vegt, and Emans, 1998; Webster and Staples, 2008). Second, team membership is fluid as congruent skills are required throughout the knowledge development process. Third, we assume knowledge is created based on team member communication and exchange of information, ideas and discoveries. Fourth, Boisot's (1995) Social Learning Cycle theory is chosen as the primary framework because it is a team learning model that considers (1) the evolving nature of information in a knowledge creation process, (2) the development of the team over the changing nature of knowledge characteristics, and (3) the team as a data transmission agent.

The primary contribution of this work lies in developing a framework that integrates information and knowledge creation with respect to the team-member learner style of acquiring and interpreting information. Based on the synthesis of Boisot's Social Learning Cycle, Kolb's Learning Style Inventory, and Lee's Modes of Learning Progression, a new integral model that suggests optimal knowledge diffusion via the proper placement of team members at various team learning stages (based on their different learner styles) is offered. Specifically, Kolb's learning styles were chosen because teams are generally comprised of individuals who possess unique approaches in their acquisition and interpretation of information. Learning style is an important determinant of how information is acquired, exchanged, and utilized within teams for knowledge diffusion and creation. However, of the existing numerous independent

theories of learner styles and knowledge development, none offers an integrated and applied perspective.

Development of the theoretical framework explores the following questions: (1) What are the required organizational settings and team learner characteristics for facilitating knowledge progression? (2) Are particular learner styles more functional at different stages of knowledge development? This paper will address the need for a more adequate conceptualization of how team-member learner styles (Kolb) can best suit the different stages in the knowledge creation–team learning process (Boisot) with the different modes of learning progression (Lee).

THEORETICAL FRAMEWORK

Current research on innovation and knowledge creation mainly revolves around traditional variables that deal with team dynamics that are either structure or leadership-oriented (Hulsheger, Anderson and Salgado, 2009; Kozlowski, Gully, Nason, and Smith, 1999). Little attention is given to team member characteristics. Similarly, Jarvenpaa and Leidner (1999) talked about knowledge sharing and facilitation based on trust development and maintenance from the beginning to the end. Bosch-Sijtsema and Rispens (2003) emphasized knowledge diffusion and transfer as a social learning process where trust and friendship is fundamental. Both theories discussed the type of knowledge transferred but did not take into consideration team member characteristics/learner styles, which has a direct bearing on building trust and friendship. As trust is grounded on open and clear communication, we argue that learner styles bear a great impact on the clarity of communication, both for the sender and the recipient. Thus, in alignment with our objective of integrating team learning characteristics in the team learning and knowledge creation process, our chosen model is more focused because its member characteristics consideration is not simply psychological (e.g. trust can be subjected to many external influences); rather, the use of Kolb's model focuses on the learners' information intake and interpretation approach which is based on knowledge and information exchange characteristics.

West and Anderson (1996) confirmed some team process variables at the international level, and DeRue and Russo (2009) emphasized alignment of team structure and standardization of the creation process with the team development cycle, both of which are more specific in illuminating the different stages of team development still the nature of information evolution over the course of the team development is neglected. The team development cycle of DeRue and Russo (2009) considered a combination of team structure, team member dynamics, team member individual focus, standardization of the creation process, and leadership requirement. While it looks comprehensive in its consideration set, the focus is limited and there is little indication of change regarding knowledge diffusion over the different stages of the team

development. Boisot's (1995) model, however, emphasizes the alignment of the team development cycle that takes information evolution and knowledge progression into consideration. It addresses issues beyond the traditional attributes of team member dynamics and maturity.

Similar to Boisot (1995), Hinsz, Tindale, and Vollrath (1997) considered groups as information processors, noting their convergence-diversity of ideas, accentuation-attenuation of cognitive processes, and belongingness-distinctiveness of members; however, the emphasis is still more on the change in members instead of the nature of knowledge/information diffusion over the course of the team development. In addition to encompassing these elements, Bosiot's model provides a more structured approach of incorporating team member learner styles to task delegation for effective knowledge creation and diffusion.

Burke, Stagl, Salas, Pierce and Kendall (2006) suggested a multilevel, multidisciplinary team adaptation model illustrates a series of phases that unfold over time where teams will adapt for optimal performance. We argue that the adaptation concept is too passive. Managers should be proactively placing team members at strategic phases for facilitating the learning and knowledge creation process.

Learning: Beyond an Individual Process

Learning theories associated with teams or social settings, such as Bruner (1960), with his idea of learning to be, and Lave and Wenger (1991), in their discussion of situated learning, have stressed how learning needs to be understood in relation to the development of human identity. The developing identity, in turn, shapes what the person comes to know and how he or she assimilates knowledge and information. In short, learning does not take place in isolation, but in relation to the members and its surrounding environment. These theories focus on the creation of a social identity in a team process within which learning takes place and makes sense.

Bandura's (1977) original social learning theory has a strong focus on individual efficacy and the dynamics of individual behavior on the social psychology of learning. Though growing transnational embeddedness and interdependence have placed an emphasis on collective efficacy to exercise control over personal destinies and national life (Bandura, 2001), a crucial question remains to be explored: What are the structures, relations, processes, and cultures required for teams to facilitate knowledge creation? Current social learning theories are relatively silent on crucial team learning processes for knowledge creation. The subsequent sections provide a close examination of prior team development models.

Current Team Development Models for Learning

Although past research has acknowledged the collaborative process of team learning (Senge, 1990; Edmondson, 2002; Van Der Vegt & Bunderson 2005), there are limitations in these existing development models for team learning and knowledge diffusion. We discuss some of the limitations that we have identified.

Lack of temporal consideration. Belbin (2004) implied that different team roles are necessary for assuring problem solving quality, continuing learning momentum, and diffusing knowledge to external parties. However, the study lacks emphasis on the explicit timing necessary for the effective execution of different roles. The concept of team learning put forth by Senge (1990a) and Huber (1991) also bears a similar deficiency even though they spelled out important characteristics of a team learning process.

Lack of contextuality. Nevis, Dibella and Gould (1995) treated organizations as learning systems. While organizations do learn, it is important to acknowledge that organizations learn through teams of workers. For instance, Tuckman's team development work (1965) focused on T-groups (sensitivity or laboratory training) and small laboratory groups. However, these teams existed in isolation and their membership was predetermined and stable. Argote et al. (2000), Moreland (1987), and Edmondson (2002) dealt with group development only as it interacts with individual group member development. Gersick (1988) focused on temporal issues and life span, and the urgency of a deadline as triggers to the group development threshold. However, team theory could be enriched if examined in the natural context, where membership is both unstable and fluid, and where other organizational factors can impact individual team members (Tompkins, 1997).

Lack of multi-dimensional theories. In prior team learning studies, there are a few examples of stage theories; however, they tend to display a single dimensional pattern. For example, Smith (1990) devised a three-stage continuum for developing new capacities. Her model implies that organizational learning does not happen at once, but rather in distinct stages of learning that individuals and groups go through: (1) new cognitive, linguistic capacities, (2) new action rules, and (3) new values and operating assumptions. Smith clearly suggested that learning occurs in a sequential pattern, but she did not address organizational learning through teams directly. It is not clear whether she arrived at these conclusions empirically or conceptually. Smith's model is most closely associated with Argyris' (1978) double-loop learning.

Cangelosi and Dill (1965) arrived at their conclusions empirically. They found in their research of seven-member student teams that group learning occurred in four stages: (1) individual learning occurs, (2) tensions develop, (3) tensions reach an uncomfortable level, and (4) adaptation takes place. Cangelosi and Dill's (1965)

adaptive learning model clearly implied that there is a sequential pattern for learning to evolve within teams, yet it did not explicitly indicate if the learning within teams ever gets translated to the organizational level to become an asset where there is memory captured for future utilization. We consider these models (which examine learning within teams) reflective of the team learning process, but they fail to address any diffusion of knowledge created from the team level to the organizational level.

De Geus (1988) proposed another four-step model for his study of the organization. His four steps focus on individual learning in the overall organizational learning context. De Geus' concern was that each phase was slow to develop and he expressed a desire to identify methods that expedited the process. Nevis, Dibella and Gould (1995) also delineated stages of organizational learning; however, there are some limitations with their proposed stage models. First, they fail to indicate how much time each stage occupies or what indicates (qualifies as) transitioning from one stage to the next. Secondly, linear (stage) models tend to ignore the environmental and complex factors that real-life teams experience as they approach organizational learning (Hackman & Wageman, 1995). Thus, there is a need for more complex theories where multiple dimensions are taken into consideration to understand how teams retrieve, understand, synthesize, and diffuse learning.

BRIEF OVERVIEW OF MODELS TO BE INTEGRATED

Social learning in a team setting has many merits. In the absence of a formal hierarchy, team members are more likely to take risks and genuinely share their thoughts and queries (Hoegl & Gemuenden, 2001; Huff & Kelley, 2003), potentially resulting in a culture conducive to innovation and knowledge generation. When the cerebral competence runs out, a team would be the greatest source of motivation to work toward a solution (Casey, 1992; Jarvenpaa & Leidner, 1999; Wittchen, van Dick & Hertel, 2011). According to Ratcheva (2008), new knowledge creation is collectively constructed and embedded in the organizing practices of teams' activities. The boundaries of such partnerships are blurred and only socially constructed by the team members. Furthermore, team members can bring a diverse array of resources and feedback (Hannah, Lord, & Pearce, 2011) to the group, expanding the team's ability to learn and produce quality work (Earley & Mosakowski, 2000; Kilduff & Angelman, 2000). It is, however, inadequate to study learning within teams only. Unraveling the learning embedded in teams and understanding how learning is diffused to the organizational level warrants further research focus.

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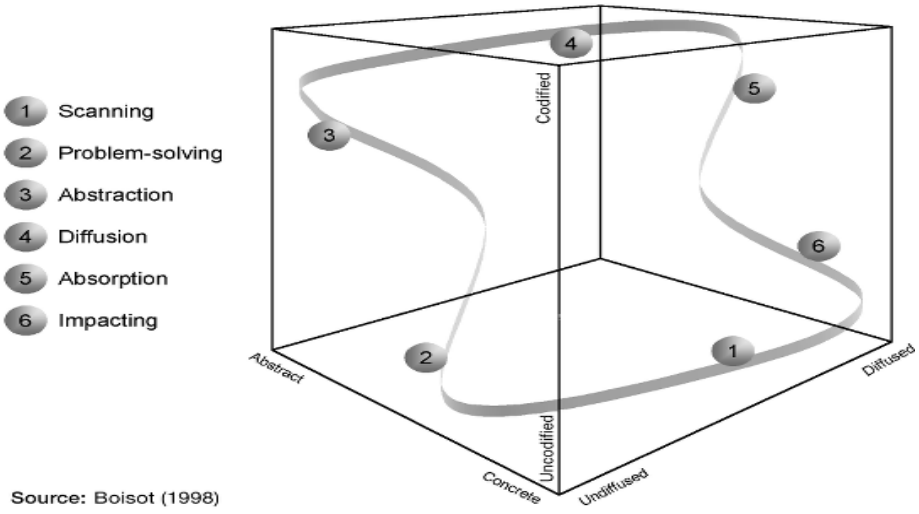
Boisot's Social Learning Cycle (SLC)

Max Boisot (1995, 1998) used an information perspective to conceptualize the dynamic interaction within groups. He articulated social learning in the Social Learning Cycle (SLC) model, which is a six-category cycle: (1) scanning, (2) problem solving, (3) abstraction, (4) diffusion, (5) absorption, and (6) impacting. Figure 1 illustrates the three-dimensional nature of the SLC model, and how this information-based approach can be construed as a potential framework for understanding knowledge creation and innovation in a team context.

FIGURE 1
Boisot's Information Space – Social Learning Cycle Model



Source: Boisot (1998)

Boisot's (1995) three-dimensional model seeks to address cyclical and concurrent events or characteristics that take place in real-life work teams, where the temporal element could be accounted for or explained. Though the SLC is also structured in terms of stages, it does not limit itself to movement in a linear sequence. Rather, it is a free-standing model that provides the dimensions for explaining the concurrent events that take place as a team matures in its learning process. The stages are indicators of different learning processes, which can take place concurrently rather than exclusive of each other.

Child, Ihrig, and Merali (2014) provide further understanding of the various types of knowledge conceptualized using Boisot's SLC perspective. It is important to note that the SLC offers a mechanism to explain data transmission and knowledge management over time. Simultaneously, teams serve as data and knowledge transmission mechanisms for organizations to learn. In other words, teams can be viewed as a vehicle for combining and integrating different knowledge attributes, ideas,

and perspectives into high-quality decisions and innovations for organizations (Brodbeck, Kerschreiter, Mojzisch, and Schulz-Hardt, 2007).

Kolb's Learning Style Inventory (LSI)

Team members, in problem solving for knowledge creation, are performing a role similar to students. Students are characterized by different learning styles, with varying preferences for information interpretation and utilization. Many learning style models have been developed, three of which have been widely adopted in the management arena. They are Jung's Theory of Psychological Type (1921) as operationalized by the Myers-Briggs Type Indicator (MBTI), Felder & Silverman's (1988) learning style category/index, and Kolb's learning style inventory (1984). The Learning Style Inventory (LSI) model put forth by Kolb (1984) can be considered the least complex and most inclusive of the prevalent models.

Kolb's learning theory proposes four distinct learning styles (or preferences), which are based on a four-stage learning cycle. In this respect, Kolb's model is particularly relevant, since it offers both a way to understand different learning styles and also an explanation of a cycle of experiential learning that applies to us all. Reynolds (1997) and Holman, Pavlica, and Thorpe (1997) pointed out that the inventory does not consider the social, historical, and cultural context of the self, either in regard to thinking or action. The inventory shows an individual's primary learning style, but the extent of change in learning style as a result of change in team membership, accumulative experience in the workplace, or cultural environment is unknown or never discussed. How an individual's learning style would change under different circumstances is unexplored.

Kolb developed a four-type definition of learning styles, each representing the combination of two contrasting approaches to information intake (Concrete Experience (CE) and Abstract Conceptualization (AC)) and two contrasting ways of information interpretation (Active Experimentation (AE) and Reflective Observation (RO)). Below are the four-stage cycle styles (see Figure 2).

1. Diverging (CE/RO)
2. Assimilating (AC/RO)
3. Converging (AC/AE)
4. Accommodating (CE/AE)

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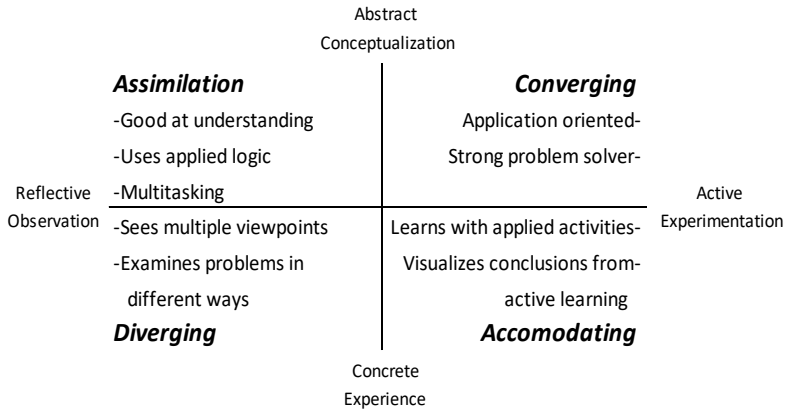
FIGURE 2
Applying Kolb's Learning StylesInventory Model



(Modified from Kolb & Kolb, 2004)

Kolb describes this cycle of learning as a central principle in his experiential learning theory, typically expressed as a four-stage cycle of learning, in which "immediate or concrete experiences" provide a basis for "observations and reflections." These "observations and reflections" are assimilated and distilled into "abstract concepts" producing new implications for action which can be actively tested in creating new experiences. Kolb maintains that ideally (and by inference, not always) this process represents a learning cycle or spiral where the learner "touches all the bases," i.e., a cycle of experiencing, reflecting, thinking, and acting. Immediate or concrete experiences lead to observations and reflections. These reflections are then assimilated (absorbed and translated) into abstract concepts with implications for action, which the person can actively test and experiment with, thus enabling the creation of new experiences.

Congruence of Kolb's LSI Model with Boisot's SLC Model

Kolb's LSI is advantageous for this study because Boisot's SLC and Kolb's LSI share a common building block—the abstract/concrete dimension—which suggests that a connection between the two models might exist. This common dimension is important because data intake is based on either the use of concrete examples or abstract conceptualization. This is a fundamental step for knowledge creation. People either deduce from concrete examples and by relating to people or induce from conceptual models to begin thinking, synthesizing and generalizing patterns.

This abstract conceptualization/concrete experience dimension is crucial for knowledge creation and diffusion. Potential relationships between the two models, together with field observation, provide a potentially rich platform for theory modification and knowledge generation.

More importantly, both the Social Learning Cycle and Learner Style Inventory theories provide an explanation of team and organizational learning without being limited to a linear or sequential method. Thus, the fluid, complex and serendipitous nature of organizational innovation could possibly be better captured. When both theories are explored in an integrated manner, it is expected that they can shed light on a process that remains understudied (Dierkes et al., 2001): the diffusion of knowledge within teams, across different teams, and up to the organizational level.

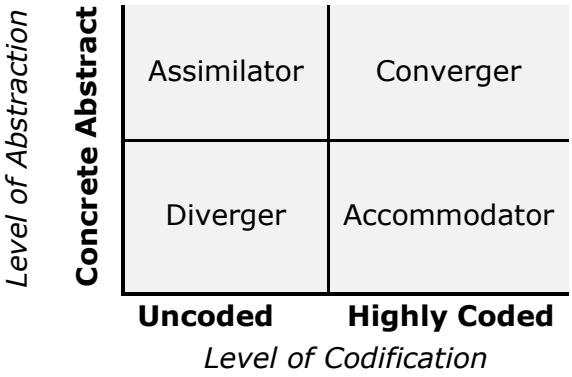
Based on a combination of the above four learning type dimensions (CE, RO, AC, AE), four statistically prevalent learning styles are derived: the converger, the diverger, the assimilator, and the accommodator.

The Social Learning Cycle model is constructed on three dimensions: *codification, abstraction, and diffusion*. As mentioned, two of these three dimensions share common denominators with Kolb's learning style inventory. Here are some examples that illustrate how these building blocks — the degree of abstraction and the degree of codification work in the Social Learning Cycle Model:

Highly abstract: Understanding and assimilating into an organization's culture.
Highly concrete: Procedure for applying for a job.
Highly uncoded: Raw data collected from a survey questionnaire.
Highly coded: Survey data organized by category or scores on scales.

Kolb's learning typology is combined with the Social Learning Cycle (SLC) to demonstrate the common transition zones (see Figure 3). Starting from the bottom left hand corner, we see that divergers are apt at learning with information that is relatively uncoded, but with experience that is relatively concrete. Accommodators are suitable for learning and facilitating learning in a highly coded information environment, with concrete experience. Convergers enjoy abstract conceptualization and highly coded data. Assimilators are comfortable with relatively high abstraction and in a low-codification learning environment.

FIGURE 3
The Model Congruence of SLC and LSI



Kolb's two dimensions are empirically grounded in a statistical analysis of individual learners and respective cognitive preferences. In SLC terms, they amount to an abstraction from concrete data. The dimensions of SLC are derived from a theory of information. Kolb's empirically-based typology of learning styles thus provides independent corroborative evidence in support of the theoretical scheme under operation. It also provided us with a definable territory to test learner styles as moderating factors to the operation of the Social Learning Cycle.

Though Kolb's learning style inventory is measured at an individual level, numerous studies have shown the theory's application and relevance in team setting and how team learning and productivity can be enhanced by placing diverse learning style members in a team (Sandmire, Vroman, Sanders, 2000; Halstead and Martin, 2002; Kayes, Kayes, and Kolb 2004). Boisot's social learning cycle theory addresses the information characteristics as it goes through a team context. Kolb and Boisot respectively view the style of individual learning and the trajectory of team learning to be characterized on a continuum of abstract/ concrete level. This common dimension suggests the foundational importance of learning through information processing, whether it is through individual or team. Through the exercise of Kolb's Reflective Observation/ Active Experimentation, knowledge that is uncodified will have a chance to be clarified, categorized, and become, more codified in Boisot's codification/ (un)codification dimension of social learning theory; thus enhancing the team learning process in knowledge creation.Kolb's Reflective Observation (RO) and Active Experimentation (AE), when exercised in a team setting can prepare the transformation of semi to fully codified knowledge to be shared with a great audience. In Boisot's language, RO and AE, when facilitated in a team setting, helps knowledge diffusion. Both theories share interwoven relevance for deeper understanding of the team learning process and knowledge creation.

Lee's Modes of Learning Progression (MLP)

Lee's (2010) modes and means of learning progression suggested that there are four modes and three means of learning progression in organizations that are conducive for innovation. Learning progression (modes) among work teams in organizations flow along two dimensions: (1) formal vs. Informal and (2) internal vs. external. The results of these combined dimensions result in a 2X2 grid with four quadrants (see Figure 4) that captured the essential characteristics of learning progression.

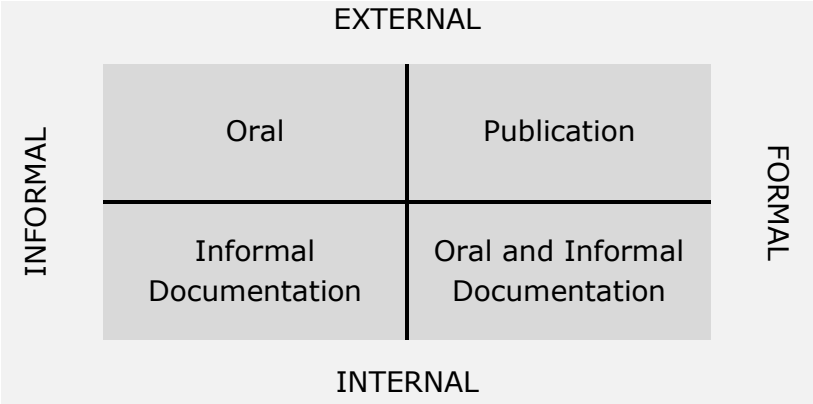
In general, formal modes of learning are documented with records for retrieval and potential review and further refinement. Informal modes can be spontaneous and serendipitous resulting in peripheral learning and potentially more insight generation in a psychologically safer environment. Formal modes of learning typically involve a structured time and space with a hierarchy where there is an information disseminator and an information recipient. Informal modes of learning can spring in a wide variety of ways such as employee lunch time (social gathering), recreational sports (sandbox time), personal retreat, etc. Both formal and informal modes of learning allow innovators to reflect on their current endeavor to ask further questions and make refinement to its work-in-progress.

Learning means generally including verbal communication, informal documentation, and formal written publication. Since the beginning of human history, learning and knowledge transfer was passed down from generation to generation via oral story telling (prior to pulp and printing technology). Verbal communication continues to be a primary form of knowledge diffusion for all civilizations until individuals reach school-appropriate ages to be educated to absorb knowledge from documentation such as books and prints. Verbal communication often provides a more relaxed atmosphere for free flow of ideas and quick feedback on ideas and concepts under incubation, making it a significant platform for idea generation in the learning community. Informal documentation refers to coded signs and symbols that are primarily recorded for personal/ internal use without formal distribution and sharing. When historians and archeologists discovered stone, cave, and utensil carvings in habitats of ancient civilizations of astrological observation and phenomenon, it can be considered a form of informal documentation and knowledge sharing. In modern times, informal documentation can range from personal notes of laboratory experiments to reflection journals derived from experiential learning. Informal documentation provides a platform for capturing useful data which can be turned into valuable knowledge in the innovation process. Informal documentation allows an innovation in semi-codified form to receive feedback and grow in a manageable and nonthreatening manner before the emergence of a fully formed idea/ product.

Formal written documentation serves as a codified record for mass dissemination. Data and information diffused through formal written documentation provides a traceable history of an innovation's development. It can be useful for identifying areas for improvement and provide an avenue for birth of multiple innovations in multiple locations among various constituents. The following example demonstrates the learning progression process using a variety of means and modes.

Research teams in universities regularly hold research seminars where guest speakers are invited to exchange the latest intellectual findings with the local university teams (formal and internal modes of learning transferred via verbal means after informal or formal documentation). When a science team (e.g. COVID-19 experts) has new discoveries, the results are usually shared in discipline-focused conferences where like-minded scientists from all over the world could gather and further spur each other's innovation efforts (formal and external modes of learning via verbal means after formal documentation). On a biweekly basis, the local teams would gather and have discussions related to research progress (informal and internal modes of learning a verbal means). Occasionally, local teams would come across colleagues from other departments or disciplines. When they discuss/share current initiatives/issues in their respective fields (informal and external modes of learning a verbal means), either new or overarching themes that were running across the organization in that particular period were usually identified. These combined means and modes of learning progression are fundamental for the collaborative effort of generating knowledge.

FIGURE 4
Lee's Modes of Learning Progression Model in an Organizational Setting



METHODOLOGY

The methodological approach to theory development here incorporates an integration of previously cited models in learning and knowledge theory. This common qualitative practice is consistent with many new developments in the social science realm.

In qualitative research, theory building requires coherence, integration, and novelty (Gehman, Glaser, Eisenhardt, Gioia, Langley, Corley, 2018). Specifically, Langley asserts that researchers should systematize their thinking while providing the wherewithal to discover revelatory phenomenon. According to Poole & Van de Ven (1989), integration of theories is a natural consequence of theoretical comparison as researchers examine and study theories from different perspectives to resolve paradoxes. In Gioia and Pitre's (1990) language, a multiple-perspectives view is an attempt to account for many representations related to an area of study (e.g., team learning, learning style, knowledge creation, and team innovation) by linking theories through their common transition zones. The various knowledge claims thus assembled can constitute a multidimensional representation of the topic area. Comprehensive understanding occurs only when many relevant perspectives have been discovered, evaluated, and juxtaposed (Cherwitz & Hikins, 1986).

Further demonstration of the validity of this methodology for theory construction include Paul's stakeholder theory enhanced by two communication theories (2015) and internet bartering attitude model based on combining social exchange theory (SET) and the theory of reasoned action (TRA) by Hsu, Yin & Huang (2017).

Karl Weick (1989, 1999) talked about theorizing as "disciplined imagination," so it is described to be a reflection of a tension between the systematic discipline part and the creative part. Thus, it is legitimate and sound methodology to compare and integrate theories from Boisot (Social Learning), Kolb (Learning Styles), Lee (Modes of Knowledge Diffusion) to synthesize a new theory (Team Learner Style Quadrant) for advancing theories in the management of innovation and learning using teams.

DEVELOPMENT OF PROPOSITIONS

The uniqueness of this paper lies in its consideration of the literature review of existing learning theories and the active examination of an emerging phenomenon that seeks to merge the theoretical frameworks. The propositions are derived by mapping the aforementioned theories onto the means and modes of the learning progression framework (Lee 2010), which is a model relevant for our synthesis and appreciation. In developing the hypothesis, we need to clarify the different environments and settings

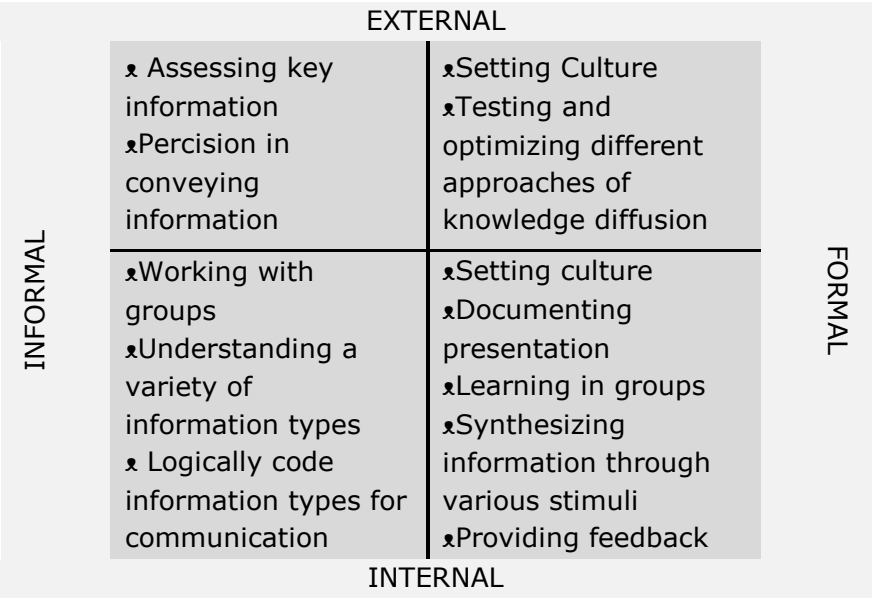
that teams operate in to learn and innovate. Subsequently, we can better understand how an organization learns through teams. The next section will elaborate further on its appropriateness for our work.

Facilitating Learning Progression

As we look further into Boisot's SLC, it is important to understand the key required organizational settings and team learner characteristics for facilitating knowledge progression. We attempted to summarize insights drawn from synthesizing Kolb's (2004) LSI learner-style characteristics with Lee's (2010) modes and means of learning progression framework (see Figure 5).

On the internal side, learners needed in a formal setting include those who are capable of (1) setting the culture and routine for information exchange and knowledge creation, (2) documenting presentations such that a repertoire of knowledge is available for further knowledge generation, and (3) learning by working in groups to gather information and listen with an open mind to receive personal feedback. Learners needed in the internal and informal setting include those who can (1) work with groups of people so that sparks of innovation can be passed on and (2) understand a wide range of information and put it into concise logical form for communication such that informally shared information that is valuable can be coded for further usage.

FIGURE 5
Team Learner Capabilities for Facilitating Learning Progression



On the external side, learners capable of setting the culture for continuous innovation exchange and testing different approaches for the best knowledge diffusion mode are necessary in the formal setting. For the external and informal mode, a person who has access to key information is needed for communicating with outsiders.

Integrating models of Boisot, Kolb, and Lee

From Kolb's learning style inventory, it is understood that different learning styles (converging, assimilating, diverging, and accommodating) have different strengths (see Table 1). For instance, learners with a converging style are good at creating ideas, experimentation, and assessing key information. Learners with an assimilating style are apt at assimilating knowledge and putting it into concise logical form for presentation. After extracting the strengths of different learner styles and contrasting them with the requirements laid out in Figure 5, the newly added row "key role in a knowledge diffusion team" was derived (see Table 2).

TABLE 1
Characteristics of Kolb's Learning Types

Learning Styles	Learning Strengths	Preferred Learning Approaches
Accommodating (CE/AE)	- Both a doer and intuitive - From specific experience - Sensitive to people and feelings - Possess ability to get things done - Risk taking - Extraversion—acting to influence people and events	- From new experiences, games, role playing, Practicing and receiving feedback - Personalized counselling and discussion - Projects and individualized, self-paced, learning activities. - Teacher as coach/helper/ role model
Diverging (CE/ RO)	- Both perceptive and achieving - Careful observer of people and sentiments before making judgments - Ability to view things from different perspectives - Introversion—looking inward for meaning	- Role play and lectures - Discussion and seeing different perspectives - Objective tests of knowledge about an issue and peer feedback - Teacher as guide/task master/ helper

Assimilating (AC/ RO)	- A strong thinker and observer - Capable of logical analysis of ideas and systematic planning - Deductive thinking—acting on the basis of one's understanding of a situation after viewing the circumstances from different perspective	- Theory reading and lectures - Study time alone and taking observer role - Clear, well-structured presentation of ideas - Teacher as communicator of information
Converging (AC/ AE)	- Both a thinker and a doer - Willing to take risk, plan and present ideas logically. - Strong at getting things done - Extraversion—acting to influence people and events	- Theory reading followed by practicing and receiving feedback. - Study time alone and small group discussion - Clear, well-structured presentation of ideas - Teacher as communicator of information and role model

TABLE 2
Key Facilitators for Different Modes of Learning Progression

Learner Style	**Converging**	**Accommodating**	**Assimilating**	**Diverging**
Strengths	Knowledge creation/idea experimentation. Accessing key information.	Hands on learning, testing different approaches for best knowledge diffusion mode.	Assimilating the knowledge and putting it into concise logical form for presentation.	Collection of feedback and information from a group.
Key role in a knowledge diffusion team	Experimenting with new ideas and creating new knowledge or innovation.	Marketing, planning execution and feedback of knowledge diffused.	Planning, refining and abstracting the knowledge created.	Setting a culture for new knowledge diffusion and absorption. Preparing the people for change.
	P1	P2	P3	P4

This row of newly synthesized knowledge created a platform for discussing the theoretical propositions. In the initial discussion of different learner style characteristics, each type of learner was capable of performing many different roles. This addition, however, was derived based on the research focus of knowledge creation teams with the intent to diffuse the knowledge. In other words, the focus was narrowed down to a key area where a particular learning style would be more functional in a specific knowledge creation and diffusion (innovation) context. As a result, the following propositions are summarized/ presented:

Proposition 1: A converging learner style would be better suited as the source for experimenting, creating, and diffusing new knowledge compared to other learner styles.
Proposition 2: An accommodating learner style would be better suited to marketing, planning execution, and feedback of knowledge diffused compared to other learner styles.
Proposition 3: An assimilating learner style would be better suited to planning, refining and abstracting compared to other learner styles.
Proposition 4: A diverging learner style would be better suited to set the learning progression culture for people to give feedback and internalize the knowledge created compared to other learner styles.

MODEL-SCENARIO DEVELOPMENT

Proposition 1 – Scenario 1

Organizational context 1: Automobile industry conference

A banker is attending an automobile industry conference with a view to find collaborative partnership to develop joint automobile-bank product offerings for customers.

In the search for an innovation like the above, we argue that a converging learner style team member will be a better suited candidate to lead this process because convergers are strong at taking risk; planning and presenting ideas logically as well as acting to influence people and events.

While accommodators are strong doers also, accommodators concern or feelings can be a hindrance to taking risk but a strength for communicating with internal staff instead of external unfamiliar parties.

Assimilators and convergers, both being strong observers and risk adverse, may be seeing more problems than opportunities in striking a deal.

Proposition 2 - Scenario 2

Organizational context 2: The banker who networked at the automotive conference returned to the office with a strong lead for potential collaboration about a bank card that allows customers to accumulate credit to service cars at different major car dealership service centers. The team now needs to meet to discuss the pros and cons of engaging in such a collaboration.

In this context, we argue that an accommodator would be most suited to plan the multiple internal meetings, market the idea, collect feedback from various constituents to potentially convince staff in the bank to support the idea.

Accommodators are better suited than divergers and assimilators because accommodators possess the extroversion to act and influence people while capable of personalized counseling and feedback. It will serve as a good internal champion to mobilize the staff to embrace the new initiative while voicing concerns that needed to be addressed.

In this context, careful observers like divergers and assimilators may find inadequate information in the innovation process to conclude for neither perspective nor action.

Proposition 3 - Scenario 3

Organizational context 3: upon collecting feedback from all the staff, an organized report with proposed timeline and action is needed to inform the constituents of progress.

We argue that an assimilator will be most suited in this refinement process for their strengths are logical thinking and analysis. They are capable of preparing tools for clear and well-structured presentation of ideas.

While convergers are also capable of preparing tools for clear and well-structured presentation of ideas; and divergers are reflective like the assimilators, assimilators are better suited because of their combined strength of reflection and planning attributes.

Proposition 4 - Scenario 4

Organizational context 4: assuming the innovation is now at an adoption stage. Staff in the bank are to introduce the new bank-automotive card to their customers. Staff are full of "what-if" questions.

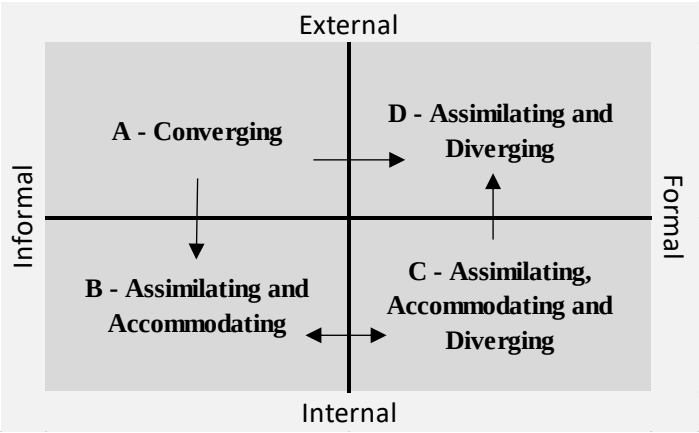
A diverger would be relatively suited in this team learning process because they are good at making sense of new and more complex ideas.

While accommodators and assimilators have similar strengths such as viewing circumstances from different perspectives and personalized discussion/ counseling, divergers, arguably, are the best at setting a conducive culture for people to embrace a new initiative.

NEW MODEL DEVELOPMENT

As discussed, it is important not only to use teams for knowledge creation, but also to understand how knowledge created is transferred to the organizational level for improved competitiveness. Figure 6, an extension of Figure 5, is a proposed model that suggests predominant learner styles for facilitating learning diffusion under different modes (Lee, 2010).

FIGURE 6
Predominant Learner Styles that Facilitated Learning Diffusion under Different Modes



Under each quadrant, the learner styles that are more functional for facilitating learning are listed. For example, in the upper left hand (quadrant A), the model suggests that converging style learners would be relatively well-suited for an external and informal mode of knowledge progression in organizational learning due to their

strong inclination to access and research key information as well as exchange and refine ideas effectively.

In quadrant B, the assimilating and accommodating styles are found to be pivotal for the internal and informal modes of knowledge progression. This is because the strengths of assimilating style learners in abstracting ideas and concepts in a logical and concise form help solve problems and generalize the innovative concepts. Assimilating learners would be able to easily pick up ideas generated from the converging style learners or the overall team. They could then process such ideas by reading and exploring the logical soundness of a theory. Accommodating style learners, on the other hand, are best at facilitating the internal working of groups of people to execute plans. The strong hands-on learning approach of accommodating style learners would be best used for experimenting with ideas and sharing different results to contribute to the knowledge-creation process.

All except converging style learners possessed the strengths and conditions required for a formal and internal mode of diffusion based on the characteristics laid out in quadrant C. In other words, learners with accommodating, assimilating, and diverging styles are best suited for (1) setting a culture for massive internal communication (accommodating), and (2) documenting and presenting the newly-created knowledge to an audience in a formal setting (assimilating), and (3) working with a group of people to collect feedback on the diffused knowledge for further refinement and future communication (diverging). Lastly, both assimilating and diverging team learners are best suited for external and formal modes of organizational learning progression because they can effectively understand a wide range of information and put it into concise logical form for communication with parties who had neither basic knowledge nor background of the newly created knowledge. The following example illustrates how teammates with different learning styles work towards bringing new knowledge into existence.

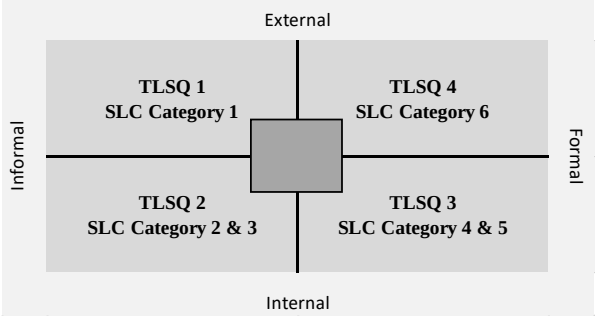
A scientific research team leader (converger) discussed his project progress with another researcher at a conference (informal and external communication). Nonaka (1995) calls this tacit-to-tacit learning progression socialization. As this team leader reviewed the relevant literature (access to new information), he came up with a worthy research question. For the next six months, he worked with his teammates (assimilators, accommodators, divergers) to find the solution to the research question. Upon finding the answer, he asked his teammate (an accommodator) who is good at using graphic software to build a presentation to illustrate and summarize the research progress and initial findings. The findings were then presented to the larger team in one of the weekly (internal and informal) meetings for collecting feedback. As the research continued, results indicated that input from other teams in the overall department would be useful, thus a formal and internal meeting was set up. At this stage, assimilators were required to continue researching and experimenting for ground-

breaking discovery, accommodators were needed to put together presentation material for sharing with the larger group, and divergers were used to set the culture for continuous information exchange and feedback collection. According to the framework, the absence of any one of the above types of team learners could adversely impact the effectiveness of organizational learning progression in this formal and internal setting. Fore example, aftermuch discussion, refinement, failure, and trials, the hypothetical team came up with an innovation that was ready for sharing with people in the field (external). Thus, a written document was drafted (by an assimilator) for formal diffusion, and a culture for continuous feedback (diverger) needed to be established so that the author of the original research question (converger) could continue to refine his team's research focus and effort. The presence of the original idea generator (converger) is not necessary during this external and formal stage of organizational learning progression if the newly-created knowledge is documented or published. However, constant feedback and communication with the original idea generator or the team who brings the innovation to fruition is critical for revision, refinement, and success, that is, internalization by the original idea generator or team (Nonaka, 1995). If the innovation is documented or published, Nonaka considers this piece of knowledge available for externalization (tacit-to-explicit sharing).

FURTHER INTEGRATION OF LSI, SLC, MLP

Our second research question investigates whether particular learning styles are more functional at different stages of team learning. To accomplish this, we merge Figure 6 with Boisot's SLC (1995) model since the latter provides relevant social learning stages for such examination (see Figure 7). It also illustrates the summarized conceptual framework which addresses our second research question. In the following section, we explain why the six categories in the SLC are recalibrated into four team learner style quadrants (TLSQ 1…TLSQ 4). To facilitate understanding of the construction of Figure 7 and Table 3, the characteristics of different LSI learner styles can be revisited (see Tables 1 and 2).

FIGURE 7
Relationships among SLC, LSI, and MLP Captured in the Team Learner Style Quadrant (TLSQ)



Team Learner Style Quadrant Framework

The Team Learner Style Quadrant (TLSQ) framework is a model that grew out of the integration of Boisot's SLC model and Kolb's LSI model and Lee's MLP model (see Table).

TABLE 3
Team Learner Style Quadrant (TLSQ) Integration Model

Team Learner Style Quadrant (TLSQ)	SLC Model	*MLP Model*	*MLP Model*	*LSI Model*	
1	1. Scanning	Informal and external	Verbal communication	Converging	P5
2	2-3. Problem solving and abstraction	Informal and internal	Verbal communication	Accommodating & assimilating	P6
3	4-5. Diffusion and absorption	Formal and internal	Verbal communication & written documentation	Accommodating, assimilating & diverging	P7
4	6. Impacting	Formal and external	Verbal communication & written Publication	Assimilating & diverging	P8

TLSQ 1 (SLC Category 1: Scanning). TLSQ 1 encompasses SLC category 1 (Scanning). This quadrant reflects small groups of individuals who scan the environment to create data or ideas for further action. The converging type of learner who prefers to experiment with new ideas and simulations is inferred to be relatively more functional in this quadrant. A setting that facilitates external and informal communication would be an effective mode for diffusing learning. A culture that allows/promotes open verbal or e-mail (in this information era) communication would be the likely means of learning diffusion.

Proposition 5: A converging learner style would be relatively better-suited for TLSQ 1 than for other TLS quadrants.

TLSQ 2 (SLC Category 2: Problem–Solving & SLC Category 3. Abstraction). In this quadrant, the approach to enquiry, problem-solving, and extension of useful

applications will be best facilitated by accommodating and assimilating types of learners who have a focus on the "hands-on" approach and a preference for abstracting concepts and testing out different approaches to resolving a problem.

Proposition 6: Accommodating and Assimilating learner styles would be better-suited for TLSQ 2 than for other TLS quadrants.

TLSQ 3 (SLC Category 4: Diffusion & SLC Category 5. Absorption). In this quadrant, the availability of newly created knowledge and internalization of knowledge through repeated use would be facilitated by a combination of learner types: accommodating, assimilating, and diverging. This indicates the variety of team member learning styles and skills variety required for diffusion and absorption of knowledge.

For example, a diverging learner would be more functional in setting the culture for discussion, gathering group information, and offering feedback in the diffusion process. The assimilating learner can diffuse through teaching by using the presentation material put together by the accommodating learners. After the formal diffusion process is completed, the diverging learner can take up the culture-setting role again to help the organization internalize (Nonaka, 1995) the newly improved process or knowledge created.

TLSQ 2 and 3 are two quadrants that encompass many of the SLC characteristics (SLC categories 2, 3, 4, and 5). All except converging team learners are functional for facilitating learning progression in these two quadrants. The discussion and exchange of knowledge created will mostly be confined to the internal organization. However, the form of feedback will shift from informal to formal. Learning will be enhanced via formal documentation of newer and refined ideas as well as verbal enquiry and feedback.

Proposition 7: All except converging learner style would be relatively better-suited for TLSQ 2 & 3 than for other TLS quadrants.

TLSQ 4 (SLC Category 6: Impacting). TLSQ 4 encompasses SLC category 6 (Impacting). In this quadrant, new knowledge becomes embedded in concrete practice and physical artifacts. Members who display assimilating and diverging learner styles are inferred to be relatively more functional in this quadrant because they are suited to be teachers, actors, and social workers (Kolb, 1984). They can facilitate organizational learning by training late adopters to acquire or use the new knowledge, or explain the value of the new creation or knowledge to existing members who are experiencing the change. The impact made by the innovation (knowledge created) will likely take place in a formal and external setting. Verbal communication and written publication are both common means of knowledge (learning) progression.

Proposition 8: Assimilating and diverging learner styles would be better-suited for TLSQ 4 than for other TLS quadrants.

The above recalibration of the six SLC categories into the four-quadrant TLSQ model shows where the respective primary and dominant SLC characteristics could take place. In practice, SLC Category 4 (Diffusion) characteristics can potentially take place in any of the four TLSQ quadrants, depending on the knowledge progression and the maturity of the innovation. For instance, if a university chemistry team presents its latest findings to the Dean of Science with a view to soliciting funding for a new laboratory, the knowledge diffusion (SLC category 4) would likely fall under TLSQ 3 because it would be a formal presentation to colleagues within the university. However, the SLC Category 4 characteristics could also take place in TLSQ 4 if it comes in the form of seeking feedback from professionals through presentations at regional conferences (formal and external).

Finally, the above recalibration of the six SLC categories into the four TLSQ quadrants provides management with a tool for managing innovation/knowledge creation through teams. Over the course of the innovation process, management could trace the development and nature of the innovation to determine the needs of the team and the support required for facilitating knowledge diffusion, thus enhancing organizational learning through teams.

Overall, the Team Learner Style Quadrant (TLSQ) framework is a working category resulting from the integration of different means and modes of learning progression, SLC, and LSI learner-style characteristics. Further confirmatory research should be conducted to verify its applicability and generalizability in the future.

An Illustration of the Team Learner Style Quadrant Framework

Consider a city park administration team that wants to build a neighbourhood park. The team's scanning (TLSQ 1) activities include negotiation with city government officials, land owners, and environmental consultants. These activities can be led by a team of two: an accommodator and a converger. When the technical details and overall preparation for the park project is on target, the team can proceed to discuss the various options with internal management. Then feedback and presentation can take place in their biweekly management meeting at the director's office, over the phone, or via impromptu conversations in the copy room or pantry/coffee room.

The team can start off with two core people leading the project, which includes activities under TLSQ 1 and TLSQ 2. The project's progress can be very smooth until it reaches TLSQ 3 where community users are allowed to voice numerous concerns. During the TLSQ 3 phase, a colleague in public relations who demonstrates an accommodating learner style can be assigned to help create communications material

for collecting user opinions. He/she can also be responsible for press releases, which directly impact the local press and user acceptability of the project. Other managers in the same unit, many of whom could be assimilators and accommodators, would be invited to help facilitate the meeting with users to collect feedback for finalizing the park location and design. The meetings that took place during the TLSQ 3 phase, designated for diffusion of information and collection of feedback, were full of simple handouts and flyers. These meetings included a large group of people that was broken down into many small groups. The smaller-size groups encouraged face-to-face communication and more in-depth sharing. The team exhibits learning characteristics that repeatedly transition between TLSQ 3 and TLSQ 1 as the feedback collected from the prospective users requires the team to return to re-identification of issues.

The converger and accommodator can team up to clarify the concerns of several community groups. Before arriving at the TLSQ 4 quadrant (impacting category), this team can make a small impact through a formal presentation of the full picture (cost-benefit analysis, survey results from community feedback, and future alternative plans). Such a presentation can be made to the city government at the end of the evaluation period by means of both written documentation and verbal communication.

Implications and Contributions

The research findings and discussions could be interpreted as a basis for further analytical and theoretical research. The paper includes eight propositions for future research. The Team Learner Style Quadrant (TLSQ) framework provides a relatively comprehensive framework for further study in at least two areas: staffing and management of teams for organizational learning (for practice), and examination of knowledge and learning diffusion (for research). Given that this research is primarily theoretical in nature, the propositions will need to be empirically tested. Future research could specifically pay attention to the following four approaches to understanding learning through teams:

1. Exploratory: What is the nature of team learning in a knowledge creation context?
2. Operationalization: What are the characteristics that indicate the movement of team learning from one category to another? (For example, how do we measure whether a team is moving from the SLC abstraction to diffusion? What evidence is involved?)
3. Validation: Does Boisot's SLC effectively represent the dynamics associated with team learning?
4. Context: Gaining additional insight into how individual team members learn and contribute to overall team and organizational effectiveness can better inform organizations about the management of "non-traditional" teams such as virtual or global teams. Future research could empirically investigate these hypotheses in such "non-traditional" team settings, which has been drawing more attention in research and practice.

CONCLUSION

This research seeks to enhance our understanding of the organizational learning and knowledge-creation processes from a team context. Specifically, it merges three existing learning theories and develops a model for future testing. Current literature on what constitutes group (team) learning is conflicting and limited. Wilson, Goodman, and Cronin (2007) suggested that groups could be designed with more explicit storage repositories and procedures. Assessment of group (team) learning should specifically include attention to how the group shares (diffuses), stores, and retrieves key information. This paper answered these calls and proposed an integrated framework, the team learner style quadrant (TLSQ), through synthesis of Kolb's (1984) learner style inventory (LSI), Boisot's (1995) social learning cycle SLC), and Lee's (2010) modes and means of learning progression, that were once independently viewed. The framework investigates questions such as "how do teams share, store, and retrieve key information for problem solving or knowledge creation?" It is unique because it addresses boundary activity for improved organizational work team performance (Ancona & Caldwell, 1992a) as the continuous nature of information development and knowledge diffusion is considered.

The idea of knowledge creation (innovation) through orchestrating teams to learn in organizations (Argote, 1999; Edmondson, 2002) is attracting increasing research attention; however, we have observed that there is no comparable model for in-depth understanding of team learning. Our model is more appropriate for this era of evolving information development that entails constant exchange and effective deployment of knowledge created. Love and Roper (2009) explored the effects of using cross-functional teams at different phases of the knowledge creation process. Perhaps this paper helps advance our understanding of the fit of team learner styles at different phases of the knowledge creation process from the social learning cycle perspective, taking into consideration the knowledge diffusion aspect that many have not explicitly addressed. As the model differentiates the strength of different learners at different stages of a knowledge creation process, the deliberate systematic information process suggested by Witten, Dick and Hertel (2011) could be capitalized to create healthy intergroup competition to generate high quality knowledge. Leaders at different stages of the framework can also exercise collective requisite complexity (Hannah, Lord, Pearce, and Jennings, 2011) to bring out the best of the team in the knowledge creation process. A team learning model with propositions for further research has been offered here in an effort to advance the understanding of learning through teams so that focused resources and management attention can be invested at the appropriate level, not only for the prediction of team learning, but also for the creation of high-quality knowledge and organizational capacity for innovation.

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