

Catalyzing organizational learning: Social, environmental, and cognitive factors
promoting effective change management

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ABSTRACT (Academic)

Diversity in the workplace remains a priority for leaders and managers as the dynamic nature of the global marketplace necessitates that organizations develop and maintain a competitive advantage in their field. Learning has long been touted as the key to leveraging limited resources to gain a corner in the market. However, organizations continue to struggle with the management of diversity, as well as systems and processes that promote learning at an organizational level. This study sought to explore a theorized relationship between individual problem-solving style, an aspect of cognitive diversity, and organizational learning capability.

Two Midwestern companies participated in this sequential explanatory mixed methods study that aimed to: (a) examine the influence of cognitive style on organizational learning; (b) explore the differences between more adaptive and more innovative individuals, with respect to their organization's cognitive climate, in terms of their development and modification of learning frameworks and shared mental models; (c) determine what role more adaptive and more innovative individuals play in catalyzing organizational learning, namely double-loop and deuterio-learning; and (d) identify inhibitors of double-loop and deuterio-learning, distinguishing differences for more adaptive and more innovative problem solvers.

Findings indicate that there was no relationship between problem-solving style, measured by KAI total scores, and organizational learning capability total scores in one organization and a small correlation between the scales of a second organization. This

finding supports Kirton's (2011) assertions that problem-solving style is independent of learning, but some organizations may have small relationships between individual's problem-solving style and organizational learning based on various organizational dynamics. Five themes emerged as cultural mediators of cognitive diversity in the context of catalyzing organizational learning: 1) corporate expectations that create a clear, concise shared mental model for employee behavior and decision making (produced and promoted via an organizational guidebook); 2) the use of agreed-upon structures and methodologies for solving problems; 3) the employment of former military officers (due to the specific skills and experiences needed to successfully fulfill specific roles); 4) the development and nurturing of healthy teams; and, 5) an expectation of boundary-less collaboration. These themes, collectively, assert the importance of a *culture that puts culture first*.

In practice, leaders and managers may find that a clearly defined culture that supports and promotes the use of systems and procedures to collaboratively solve problems and extend learning from individual to organizational is essential to mitigating the challenges that may result from exploiting cognitive diversity in the workplace.

ABSTRACT (Public)

Change is a constant for organizations as they strive to compete for resources in a global marketplace. In order to gain and maintain a competitive advantage, organizations are challenged to manage change, as well as diversity and differences among employees, effectively. An understanding of how these differences, namely cognitive diversity, impact problem solving and learning is central to this study, as diversity in the workplace continues to increase and the need to problem solve and learn together necessitates management of this particular aspect of diversity. Furthermore, the relationship between these two processes, specifically at the individual level, has not been clearly explicated.

This study sought to explore a central question: Does the manner and style by which an individual prefers to engage in the problem-solving process catalyze organizational learning in the form of revised policies and procedures (single-loop), amended norms, values, or core focus (double-loop), or changes to the frameworks and mental models that produce learning outcomes (deutero-learning)? Two Midwestern companies participated in this study and provided the first empirical data to suggest that problem-solving style is unrelated to one's organizational learning capability. Through a series of interviews, five practices appear to mediate aspects of an organization's culture and reduce the challenges associated with the management of cognitive diversity that often limit the success of problem solving and learning efforts. These mediating cultural factors are: 1) corporate expectations that create a clear, concise shared mental model for employee behavior and decision making (produced and promoted via an organizational guidebook); 2) the use of agreed-upon structures and methodologies for solving problems; 3) the employment of former military officers (due to the specific skills and

experiences needed to successfully fulfill specific roles); 4) the development and nurturing of healthy teams; and, 5) an expectation of boundary-less collaboration.

While these findings are not novel, they do underscore the importance of culture in developing the systems and structures that promote effective problem solving and learning at an organizational level. These results suggest that leaders and managers must continue to advocate for and manage cognitive diversity as the problems faced by organizations today are more complex and intractable. By employing mediating cultural factors and investing resources in a “culture first” environment, the benefits of cognitive diversity can be exploited for organizational gain and managed to minimize coping. Championing a strategic learning environment provides a context in which individual learning and social structures permit powerful higher-order learning that engages, challenges, clarifies, and optimizes the shared resources available for problem solving and organizational success.

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INTRODUCTION

As the complexity of problems facing industries, communities, and leaders today continue to evolve, problem-solving efforts must be re-examined as a learning process that results in the generation of new knowledge that advances an organization's mission and competitive advantage. Global markets, rapid technological advances, strategies for adapting to and managing change has inspired a multi-generational workplace in which individuals must process information, generate new knowledge in a social context, and engage institutional learning frameworks in order to embed new rules, policies, procedures, and behaviors within the cultural context of the organization. Scholars suggest that individual-level problem-solving style plays a role in the aforementioned organizational learning process, however the field lacks empirical evidence to support these claims (Hayes & Allinson, 1998).

This sequential explanatory mixed method study of two Midwestern companies examined the influence of problem-solving style (Kirton, 2011) on organizational learning capability (Jerez-Gómez, Céspedes-Lorente, & Valle-Cabrera, 2005). This chapter introduces the background of the study; the need for the study; the problem statement; potential significance of the study; the purpose statement; conceptual and theoretical frameworks; methodologies and data analysis; and, assumptions and limitations.

The dynamic nature of problems facing organizations today are more complex than ever before. Many problems that are brought to the attention of organizational leaders are without resolution, similar in nature to Rittel and Weber's (1973 as cited in Grint, 2005) definition of a Wicked Problem:

Complex, rather than just complicated, it is often intractable, there is no unilinear solution, moreover, there is no ‘stopping’ point, it is novel, any apparent ‘solution’ often generates other ‘problems’, and there is no ‘right’ or ‘wrong’ answer, but there are better or worse alternatives. (p. 1473)

Scholars have suggested, “the only sustainable competitive advantage is a firm’s ability to learn faster than its competitors” (Crossan, Lane, White, & Djurfeldt, 1995, p. 337). This complexity requires leaders and managers to engage in problem-solving and decision-making activities together in an effort to advance shared organizational goals. Furthermore, the embedded nature of problem solvers within teams, organizations, and systems requires an understanding of the multifaceted nature of the problem-solving process, as well as the systems and structures that enable and limit effective change management. Consequently, leaders and managers must become adept at identifying the problem to be solved, managing individual differences and distractions that arise during the problem-solving process, and utilizing the structures and systems—those developed internally and imposed from external forces (i.e. regulatory institutions)—in order to deliver on their purpose.

The importance of problem solving, viewed as a process that results in learning, is further underscored as the lasting effects of organizational learning that often result from effective problem solving efforts. As change is often the desired outcome of problem solving, learning must become a focus of the process and an expected outcome, requiring leaders and managers to consider the complexity of these interrelated practices. As such, the layers and levels of each process must be understood, as well as the factors that inhibit and catalyze successful change management.

Nonaka (1994) claims, “The theory of organization has long been dominated by a paradigm that conceptualizes the organization as a system that ‘processes’ information or ‘solves’ problems” (p. 14). Nonaka’s (1994) assertion suggests that organizations must be able to do both, transitioning between these interrelated roles that contribute to learning that resolves technical problems and affirms or reimagines organizational assumptions, values, and at times, core purposes (Nonaka, 1994). Learning in these ways is not simply the collection of learning on behalf of an organization’s members, but rather a process that integrates an individual’s learning in order to process information, solve problems, and generate novel ideas and solutions.

Noting that individual learning must be socialized to become organizational (Nonaka, 1994), the development and modification of shared mental models, and the ambiguity of this process in the context of innovation and problem solving necessitates a more thorough understanding of the influence of individual variables in order to offer insights into the nature and implementation of organizational interventions that catalyze and sustain organizational learning. Hayes and Allinson (1998) suggest that individual-level problem-solving style plays a role in the aforementioned organizational learning process, however the field lacks empirical evidence to support these claims. Problem-solving style offers insights into the perceptions of problems, the use of structures in the problem-solving process, and broadly the necessity to manage cognitive diversity in order to focus resources on the agreed upon problem at hand (Kirton, 2011).

In 1965, Cangelosi and Dill concluded:

To better specify the constructs of organizational learning, to elaborate them to test them, or to replace them, more empirical work is needed. Such work should

focus on the interactions between individual and organizational learning; on the identification of those facets of environment, organization, and personality that define an organization's unique learning task and its learning potential; and on the search for behavioral cues that will let us better anticipate and identify learning when it actually takes place. (p. 202)

Three decades later, Crossan et al. (1995) suggested the challenge had not yet been met; more than a half century later, scholars are still unable to respond to Cangelois and Dill's (1965) statement of opportunity with clarity, certainty, and agreement. This call for further empirical study has been addressed by researchers from various disciplines for many decades, yet these efforts have not resolved the questions that remain for scholars and practitioners alike. Providing empirical evidence to explore these questions is the core focus of this research effort.

Background of Study

In an effort to advance the quality and pace of organizational learning, noting the competitive advantage achieved by organizations that continuously and efficiently learn, Hayes and Allinson (1998) posit that individual-level problem-solving style may be a contributing factor in the understanding of individual-level learning, and the process by which individual-level learning becomes organizational. These assertions, however, remain unresolved and little empirical evidence exists to clarify the influence of problem-solving style in information processing, knowledge creation, the development, revision, and institutionalization of learning frameworks, and the behavioral outcomes that suggest learning has become embedded in the culture, artifacts, and rules that govern an organization.

Defining an organization as a “system that ‘processes’ information or ‘solves’ problems” (Nonaka, 1994, p. 14) by engaging "a set of explicit and implicit rules which prescribe the way members behave,” (Hayes & Allinson, 1998, p. 848; Swieringa & Wierdsma, 1992) underscores the necessity of individuals to learn about organizational rules and norms, as well as policies and procedures that direct organizational activities. Individual-level learning, however, is not sufficient to produce the results needed to compete in a complex, ever-changing global market, and must be mediated at the organizational level by learning frameworks and shared mental models that aid in framing and solving problems.

Problem solving, defined by Kirton (2011) is a means of detecting a need for change and resolving the perceived novelty by creating a new set of circumstances that better prepares the individual to identify and address future novel circumstances, is considered the highest form of individual cognition, resulting in learning as one responds to a stimulus or precipitating event that necessitates change (Gagne, 1959). Thus, the embedded processes within the constructs of learning and problem solving offer parallels that contribute to the understanding of the individual level cognitive process, and lends insight into the ways in which knowledge and experience are shared in an effort to create change. Swieringa and Wierdsma (1992) argued that collective learning, or the process by which learning transcends individual thinking and becomes organizational, leads to collective change. Furthermore, Lyles and Schwenk (1992) have conjectured that individual thinking and cognitive processing, including the development and utilization of knowledge structures, contributes to organizational-level strategies that aid in problem formulation and the development of strategic resolutions; integral aspects of the problem-

solving process. Conceiving of problem solving as a learning process in which resolutions lie within the “input-process-output” sequence of hierarchical information processing, researchers and practitioners must fully understand the variables that catalyze and inhibit organizational learning (Nonaka, 1994, p. 14).

In partnership with a strategic consulting firm, two Midwestern companies, together engaged in product development and sales for a total of more than 180 years, were selected to participate in this study. Both companies have voluntarily engaged a third-party consulting firm to provide consultation and highly collaborative, methodical strategies for business performance improvement.

Crown Inc.

Crown Inc., a privately-owned manufacturing materials company with facilities in 19 communities, spanning five states, describes itself as being highly motivated as its employees continually seek to improve their products and processes in order to exceed customer expectations. With a focus on high-quality product delivery, Crown Inc. emphasizes the importance of a strong, consistent organizational culture and corporate leadership, and systematic processes that support their standing as an industry leader. The company has taken steps to continue strengthening its organizational culture, systems, and leadership development initiatives since 1994, and has since engaged a third-party strategic consulting firm to support these efforts.

Risk Corps.

Risk Corps. is a privately held Fortune 500 company that provides various financial and insurance services for individuals and corporations in the United States. Ranking as one of the top five companies in its field, Risk Corps. purports a commitment

to unwavering company values and a history of strong, stable performance across the company's many services.

A transition of a top executive in 2005 served as the catalyst for a change in company culture, including an emphasis on putting the customer first in all employee efforts. To augment and assist in managing this change process, Risk Corps. engaged a third-party strategic consulting firm to support various departments and teams within the organization as change efforts are ongoing.

Problem Statement

Organizational learning has been studied widely and yet there remains little agreement amongst researchers regarding the process, catalyzing variables, and inhibitors of this process within the dynamic, rule-bound systems that organizations find themselves today. The study of organizational learning, examined as a process that evolves over time in response to changing internal and external environmental conditions, necessitates clarifying the variables that contribute to the various typologies of organizational learning. This study aims to examine Hayes and Allinson's (1998) assertion that problem-solving style is a central variable that merits additional study in the context of organizational learning as they claim:

Problem-solving style influences how people process the information that enables them to interpret changes in situations, assess the consequences of their own and others' actions in situations, and use this understanding to refine or radically redefine their subjective theories or mental models of how the world, or that part of their world that immediately concerns them, operates. (p. 851)

Hayes and Allinson (1998) further assert that a lack of empirical data is available to support these claims; their claims compel additional research efforts to determine the extent to which individual-level problem-solving style can be applied to the theory of organizational learning, as conceived by Argyris and Schön (1996).

In addition to exploring the influence of problem-solving style on organizational learning broadly, this study empirically investigates claims that the most adaptive and the most innovative members of an organization, when compared to the consensus group as determined by Kirton's (1976) Adaption-Innovation (A-I) Inventory, engage in change processes including problem solving and organizational learning differently (Hayes & Allinson, 1998; Kirton, 2011). Hayes and Allinson (1998) apply this notion to the process of organizational learning, speculating a relationship between single-loop learning and doing things better, and double-loop learning as a means of doing things differently or doing different things; but their assertion has not been empirically tested. In terms of Kirton's (2011) A-I theory, the notion of doing things better or refining pre-existing ideas is articulated as adaption, and doing things differently or experimenting is noted as innovation. The relationship between more adaptive and more innovative problem-solving styles and an individual's role in catalyzing these typologies of organizational learning warrants further investigation in an effort to more fully understand the factors that conduce to, and limit, learning and change.

An understanding of the catalysts and inhibitors of organizational learning, in terms of individual problem-solving style, aims to provide insights that inform the management of cognitive diversity and exploit opportunities for individual and

organizational learning. This analysis emphasizes the management of cognitive diversity as it relates Problem A and Problem B, which defined below.

As organizations respond to the ever-changing global marketplace, the need to adapt, innovate, and learn is essential to achieving and maintaining a competitive advantage. An exploration of the factors that contribute to an understanding of organizational learning as a process—Managerial Commitment, Systems Perspective, Openness and Experimentation, Knowledge Transfer and Integration (Jerez-Gómez et al., 2005)—with an emphasis on the influence of problem-solving style on each factor may be used as a foundation for future research, and the development of effective interventions that enhance an organization’s capacity to engage in various typologies of organizational learning and manage the benefit and cost of cognitive diversity.

Purpose and Research Objectives

Hayes & Allinson (1998) posit a relationship between problem-solving style, and individual and collective learning in an organizational context, noting a lack of empirical evidence in practice to suggest that problem-solving style conduces organizational learning by way of establishing, reinforcing, or revising shared mental models. In an attempt to advance research in this field, a sequential explanatory mixed methods study of two Midwestern companies sought to address the following research objectives:

1. Examine the influence of problem-solving style on organizational learning, specifically the four dimensions identified by Jerez-Gómez et al. (2005): (a) Managerial Commitment; (b) Systems Perspective; (c) Openness and Experimentation; and, (d) Knowledge Transfer and Integration.

2. Explore the differences between more adaptive and more innovative individuals, with respect to their organization's cognitive climate, in terms of their development and modification of learning frameworks and shared mental models.
3. Determine what role more adaptive and more innovative individuals play in catalyzing organizational learning, namely double-loop and deuterio-learning.
4. Identify inhibitors of double-loop and deuterio-learning, distinguishing differences for more adaptive and more innovative problem solvers.

Significance of the Study

Scholars have suggested, “the only sustainable competitive advantage is a firm’s ability to learn faster than its competitors” (Crossan et al., 1995, p. 337). That being said, the complexity of organizational learning cannot be overstated. The study and practice of organizational learning often includes environmental and contextual factors, organizational structures, learning processes and strategies, organizational culture, and learning content (Fiol & Lyles, 1985). This complexity and the embedded nature of an individual and the individual learning process within the systems and structures that reify organizational learning necessitates a research focus that explicates these individual components.

Noting that individual learning must be socialized to become organizational (Nonaka, 1994), the development and modification of shared mental models, and the ambiguity of this process in the context of innovation and problem solving, necessitates a more thorough understanding of the influence of individual variables in order to offer insights into the nature and implementation of organizational interventions that catalyze and sustain organizational learning.

Assertions regarding the influence of individual level problem-solving style must first be explicated, as literature suggests the identification of problems and threats, as well as the structure of shared mental models for knowledge creation and learning are influenced by individual problem-solving style and the resulting cognitive climate (Hayes & Allinson, 1998; Lyles, 2014; Kirton, 2011). Additionally, Kirton (2011) posits that, in terms of problem-solving style, the most adaptive and most innovative individuals perceive problems and engage in the individual-level problem-solving process differently. Learning frameworks and shared mental models mediate the individual-level, problem solving and learning processes and organizational learning process, thus a deeper understanding of how individuals with diverse problem-solving and learning preferences engage in developing, accessing, and utilizing learning frameworks, and their experience doing so, will further illuminate factors that catalyze and inhibit various typologies of organizational learning.

As a result, researchers and practitioners may be better prepared to develop interventions that promote double-loop or deuterio-learning as a means of enhancing an organization's ability to achieve its mission and innovate in response to a rapidly changing global marketplace. This research has implications for the development of organizational policies and procedures, diverse intra- and inter-organizational teams and workgroups, and aims to elevate the value and necessity of organizational learning as a core focus of organizational leaders.

Theoretical Framework

This study draws from literature that spans many social science disciplines, including two theories of change: Organizational learning and Kirton's A-I theory. The intersection of these theories provided the framework for this research.

Organizational Learning

Research on organizational learning has increased in recent years, diverging methodologically as well as theoretically, as scholars from various disciplines debate whether learning should be studied as a cognitive or behavioral process (Argote, 2011; Dodgson, 1993). During this time, the environment in which organizations find themselves has also evolved, necessitating a change in the processes that contribute to knowledge creation and organizational learning, as many organizations strive to remain relevant and competitive in their respective markets (Nonaka, 1994). While consensus among scholars regarding the constructs and processes that contribute to effective organizational learning remains scarce, this study will examine organizational learning as an individual-level cognitive process that becomes organizational "when members of the organization act as learning agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory in use, and embedding the results of their inquiry in private images and shared maps of organization" (Argyris & Schön, 1978, p. 23). This definition emphasizes the process of inquiry, knowledge creation, and learning (as an outcome of inquiry and knowledge creation), which offers a distinct parallel to the problem-solving process and the opportunity to investigate the influence of an individual's preferred problem-solving style on the process of organizational learning.

Organizational learning is not simply the cumulative result of members' learning, but rather a process that requires information and new knowledge to become embedded in the behaviors, culture, mental maps, and values of organization over time (Hedberg, 1981). Furthermore, this process results in various typologies of learning and associated actions at the organizational level (Hedberg, 1981). Argyris and Schön (1996) articulate a schema for organization learning, which includes “[a] informational content; [b] a *learning product*; [c] a *learning process* which consists in acquiring, processing, and storing information; [d] and a *learner* to whom the learning process is attributed” (p. 3). Through the process of error detection and correction, learners' actions to preserve current objectives by making adjustments to current theories-in-use in order to correct inefficiencies, errors, or to engage in minor improvements with the intent of maintaining stated organizational tasks are engaged in single-loop learning (Argyris and Schön, 1996). This instrumental learning may result in the revision or replacement of shared mental models through which individual learning becomes socialized and embedded in organizational efforts, however single-loop learning avoids challenges to the core pillars of the organization—its values, assumptions, beliefs, and purposes (Argyris & Schön, 1996).

Double-loop learning, also referred to as meta-level learning (Hedberg, 1981), necessitates changes in norms, values, beliefs, and worldviews as a means of correcting errors. This process not only results in changes to theories-in-use, policies, procedures, and organizational activities, this rare form of learning engages learners in a process of generative thinking that illuminates new ways of defining an organization's mission, vision, and culture (Argyris & Schön, 1996; Hedberg, 1981; Hussain & Yazdani, 2013).

Lastly, inquiry through which an organizational enhances its capacity for learning of all types (i.e. single- and double-loop) has been referred to as deuterio-learning; a complex, highly-reflective process that requires intentional focus and dedicated leadership to achieve (Argyris & Schön, 1996; Hedberg, 1981). This learning typology necessitates that members reflect on previous contexts for learning, as well as episodes during which the organization failed to learn, as they consider how and why they must change with a deeper understanding of the variables and strategies that facilitated and inhibited prior learning (Hedberg, 1981). This process results in the development of cognitive strategies aimed at facilitating adaption or innovation, and novel theories-in-use that will serve as a foundation for action toward revised purposes.

The establishment of shared mental models and knowledge structures that contribute to knowledge creation and organizational learning are influenced by problem-solving style, as these models are developed and challenged based on an individual's preferences for solving problems (Hayes & Allinson, 1998). Noting that individual mental models are malleable, adapting in response to changing beliefs, social, political, and informational shifts, these changes have implications for shared mental models and the efficiency and efficacy of collective learning. Threats to the development and maintenance of shared mental models, resulting from organizational learning, may be examined in light of problem-solving style, whereas cognitive diversity is viewed as a contributor to, and inhibitor of, organizational learning (Hayes & Allinson, 1998; Kirton, 2011).

Kirton's Adaption-Innovation Theory and Agents of Change

Kirton's (2011) Adaption-Innovation Theory (A-I) assumes that all people are creative and all people solve problems. Diversity of problem-solving style—differences in the way people perceive problems, engage structure and rules in the process of solving problems, and manage those differences—provides a novel lens through which to examine the process of learning and change within an organization. Kirton (2011) defines problem-solving style as the stable, preferred way in which a person conceives of a problem, and proceeds to a resolution, and is measured along a continuum by Kirton's (1976) KAI. Kirton (2011) notes many different traits that are associated with problem-solving style, including “risk-taking, dogmatism, tolerance of ambiguity, extraversion, conservatism, flexibility... but excluding such traits as anxiety, neuroticism, or another element of cognitive affect” (p. 6). This argument suggests that problem-solving style is a “continuum at the level of a dimension of personality” (Kirton, 2011, p. 6).

Using the terms “more adaptive” and “more innovative,” Kirton (2011) describes problem solvers' use of structure in the problem-solving process, noting that more adaptive problem solvers strive to make situations “better” by engaging pre-existing structure and rules, while more innovative problem solvers often alter current structures and rules in an effort to generate solutions that are perceived as “different.” This diversity is advantageous as differing approaches and perspectives in the problem formulation and strategy development phases of the problem-solving process are engaged. However, the management of this diversity presents unique challenges for organizations and individual problem solvers as they strive to process information,

generate knowledge, and engage in organizational learning to innovate, adapt, and remain competitive in their industry and sector.

Individuals engaged in change efforts are described as agents of change (denoted as AC¹) (Kirton, 2011). Kirton (2011) suggests members of a problem-solving team with KAI scores that fall within +/- 10 points of the mean KAI score of the group, which denotes one standard deviation, are considered to be members of the majority or consensus group; individuals in this group are notated as AC²s. Members of a problem-solving team outside of the consensus group (estimated to be 40% of the problem-solving team assuming a normal KAI distribution), notated as AC³s (who may be more adaptive or more innovative), often experience stress and are required to engage coping behaviors in order to maintain membership in the broader group and engage in productive problem-solving behavior; are naturally less comfortable in the context of the team or organization due to the difference in their preferred process for engaging in problem-solving behaviors (Kirton, 2011). An AC³'s cognitive difference "allows them to specialize in those tasks they naturally prefer and which the consensus group does not" (Kirton, 2011, p. 231). As such, their value within the problem-solving team is apparent. However, due to the often-poor integration within the problem-solving team and the cost of managing diversity, AC³s often experience discomfort and must engage in coping behaviors in an effort to mitigate the stress resulting from the gap in problem-solving styles. Kirton (2011) has noted that power lies within the largest group with cognitive cohesion—AC²s—often resulting in further disengagement, discomfort, and retreat of AC³s due to the cost of long-term coping.

AC³s are of particular interest in the context of this study due to their unique perceptions of problems and possible strategies to address them. As AC³s often challenge the thinking, processes, and suggestions of the consensus group, or AC²s, Kirton (2011) suggests that AC³s may play an important role in knowledge creation and organizational learning, namely double-loop and deuterio-learning (Hayes & Allinson, 1998; Swieringa & Wierdsma, 1992).

The study of individual problem-solving style may inform the study of organizational learning, as well as aid in understanding and describing the process by which a precipitating event leads to an opportunity for individual learning, and subsequently, becomes organizational. This study will be the first to investigate the relationship between these two dynamic theories empirically, providing resources for consultants, leaders, and managers that may inform their development of problem-solving teams, deployment of organizational resources, the design and implementation of organizational structures and systems, as well as employee training and development initiatives that aim to exploit the diverse talent dedicated to resolving a shared problem.

Overview of Methodology

The target population for this study consisted of employees ($N = 397$) from two Midwestern companies engaged in organizational change efforts. This analysis utilized a sequential explanatory mixed methods design: quantitative data was collected from two populations, followed by the collection of qualitative data (Creswell & Plano Clark, 2011). The analysis of qualitative data was used to interpret the quantitative data, providing a rich context for the interpretation and understanding of the data (Teddlie & Tashakkori, 2009). Participants completed a 16-item demographic survey, followed by a

16-item organizational learning capability instrument (Jerez-Gómez et al., 2005); KAI scores were provided, with consent from participants, from a third-party consulting firm in the form of data-on-hand. Semi-structured interviews were conducted by the researcher with 16 participants during the qualitative phase of the study.

Quantitative Data Collection

KAI. Kirton's Adaption-Innovation Inventory (KAI) is a psychometric tool that measures problem-solving style (Kirton, 2013). The KAI inventory contains 32 assessment items and provides a total score scale ranging from 32 to 160 (Kirton, 2009). Administered online by a third-party consulting firm and provided to the researcher in the form of data-on-hand, participants are asked to score each item on a continuum from "very hard" to "very easy." KAI has an internal reliability coefficient range between .84 to .89, indicating good reliability among items in this scale (Kirton, 2013).

KAI contains three summed construct scores, or sub scores, which provide additional insight into one's preferred problem-solving style. These subscales include: Sufficiency of Originality (SO), describing idea generation; Efficiency (E), describing problem solving methodology; and Rule/Group Conformity (R), describing the management of social structures (Kirton, 2013).

Organizational Learning Capability. The organizational learning capability instrument includes 16 items with response options on a Likert scale from one to seven, with one representing "strongly disagree" and seven representing "strongly agree" (Jerez-Gómez et al., 2005). The assessment includes four summed dimensions:

- (1) Managerial Commitment: Recognition of the importance of learning by managers and leaders, and the development of a culture that promotes the

acquisition, creation, and transfer of knowledge as paramount, both in terms of strategy and as a fundamental value;

(2) Systems Perspective: Developing a shared identity through mental models, language, and an emphasis on relationships that contribute to the achievement of shared organizational goals;

(3) Openness and Experimentation: A commitment to diversity and exploring novel ideas, with an emphasis on individual knowledge being renewed and expanded, as well as tolerance for controlled risk-taking and learning from one's mistakes; and,

(4) Knowledge Transfer and Integration: Simultaneous transfer and integration of information between individuals and throughout an organization through social engagement, systems, and processes (Jerez-Gómez et al., 2005).

The organizational learning capability instrument has an internal reliability coefficient range between .72 and .82, and a Cronbach's alpha of .88 for the whole scale, indicating good reliability among questions (Jerez-Gómez et al., 2005). The instrument was administered via an online survey by the researcher and provided to participants by email.

Descriptive statistics were used to describe participant KAI scores and group individuals as AC²s (10 points or less from the group's average KAI score), and AC³s (more than 10 points from the group's average KAI score). A bivariate (Pearson) correlation was used to determine whether a relationship between KAI score and organizational learning capability existed at a significance of .05

Qualitative Data Collection

The qualitative phase of the study utilized semi-structured interviews to better understand the quantitative data. The researcher selected interview participants based on data collected during the quantitative phase of the study, using high organizational learning capability scores to denote a population ($N = 50$) that would receive an invitation to participate in an interview; 16 participants consented to participate, including AC²s ($n = 4$) and more adaptive AC³s ($n = 7$) and more innovative AC³s ($n = 5$). The researcher developed an interview protocol (Appendix A) using *a priori* propositions (Appendix B) and interviewed participants via phone. Recorded interviews ranged from 22 to 64 minutes in length and were transcribed by an independent transcriber. The researcher selected pseudonyms for each company to ensure the confidentiality of the organizations; participants were identified by a participant number for purposes of confidentiality. Transcribed interviews were coded in ATLAS.ti using the constant comparative method of analysis, and further sorted to identify categories and themes (Corbin & Strauss, 2008).

Researcher Subjectivity

In qualitative research, the researcher's role in the construction of knowledge and the subsequent meaning-making of the knowledge necessitates reflexivity to ensure the credibility of the research effort (Ary et al., 2013). The following reflexivity statement aims to situate my own beliefs as they relate to this study.

Paradigmatic Stance. Paradigms, or one's worldview, consists of "a basic set of beliefs that guide action" (Guba, 1990, p. 17 as cited in Creswell, 2007, p. 19).

Collectively, these views include philosophical assumptions, epistemologies, ontologies, and conceptions of research methodologies (Creswell, 2007). Utilizing this frame for

expressing epistemological and ontological assumptions, I identify as a pragmatist, challenging the distinct contrast between the opposing poles of philosophical notions of dogmatism and skepticism (Teddlie & Tashakkori, 2009). Within the pragmatic paradigm, I am guided by a personal values system, a deep connection to the topic of study, and the emphasis placed on the outcomes of research (e.g. actions, situations, and the consequences of inquiry), which I believe is contextually-relevant (Creswell, 2007). Cherryholmes (1992) submits:

For pragmatists, values and visions of human action and interaction precede a search for descriptions, theories, explanations, and narratives. Pragmatic research is driven by anticipated consequences... Beginning with what he or she thinks is known and looking to the consequences he or she desires, our pragmatist would pick and choose how and what to research and what to do. (p. 13-14 as cited in Teddlie & Tashakkori, 2009, p. 90)

Pragmatists view knowledge as a tool (Cook & Brown, 1999); this perspective takes into account the individual and the group, as well as their interactions as a form of practice or, *“the coordinated activities of individuals and groups in doing their ‘real work’ as it is informed by a particular organizational or group context”* (Cook & Brown, 1999, p. 386-387 italics in original). Consistent with this paradigmatic stance, I employed multiple methods of data collection in an effort to address the questions at hand; both quantitative and qualitative data were collected and analyzed, as I believe the method must be responsive to the research problem (Creswell, 2007). As such, the pragmatic paradigm allowed me to explore the aforementioned set of research questions, aiming to interpret the experiences of individual problem solvers and the embedded social context of fast-

paced corporate settings.

I cannot articulate a specific life event or experience that compelled me to reflect this stance; it just seems logical, clear, and flexible enough to allow one's mind to explore various interests via research. Questions serve as a guide to exploring the context in which a problem or opportunity exists. Understanding organizational behavior within the nonprofit sector has been important to me for many years. This research allowed me to explore questions and challenges that face all organizations, expanding my understanding of the organizational behavior, broadly, and interventions that will support future organizations that I may serve.

Assumptions, Limitations, and Scope

Several assumptions must be explicated in an effort to clarify the purpose and objectives of this research study. First, both Crown Inc. and Risk Corps. voluntarily engaged in an intervention with a strategic consulting firm specializing in lean methodologies for business success. While a strategic, problem-solving intervention may enhance an organization's capacity to engage in organizational learning, this variable serves as a control due to the involvement of both companies.

Noting the importance of management's openness to change and risk, it is assumed that managers at both Crown Inc. and Risk Corps. are committed to a process of change due to their voluntary engagement with external consulting services.

Pre-existing knowledge is a variable that may impact an organization's capacity for organizational learning (Firestone & McElroy, 2004). I assumed the maturity of Crown Inc. and Risk Corps. includes diverse staff, a deeply-embedded company history

set within the context of their respective industries, and employees with expertise in their fields.

I also assumed that learning, generally, has positive consequences, even when viewed in the context of learning from mistakes or failures (Dodgson, 1993).

Lastly, I assumed that change is the only constant, and that learning is required for change, and effective problem solving.

Limitations

This study was limited by the sample provided by the third-party consulting firm. Specifically, participants from Crown Inc. included more mid-level and executive managers, in comparison to the sample from Risk Corps., which consisted of a higher percentage of entry-level positions and fewer mid-level and executive managers.

Scope

This study examined the process of organizational learning, but did not explore the concept of the learning organization, as the latter necessitates an intentional prioritization of learning as a component of the organization's overall purpose and mission, including the allocation of resources accordingly (Garvin, 2000; Senge, 1990; Senge, 2014).

Definition of Terms

The following terms have been defined and used accordingly within this study:

Adaption: "A preference for effecting change by initially accepting the current consensually agreed structure within which the problem is embedded and by using it to achieve a solution, thereby prudently altering the structure for later improved use"

(Kirton, 2013, p. 9); this preference may result in fewer novel, risk-limited ideas to solve a problem. Adaption contrasts with an innovative problem-solving style (Kirton, 2011).

Agent of Change: Each person is capable of solving problems; because we solve problems, we are agents of change (Kirton, 2011). Also denoted as AC¹.

AC²s: Agents of change with KAI scores that fall within the majority or consensus group (+ / - 10 points from the average KAI score of the group) (Kirton, 2011).

AC³s: Agents of change with KAI scores that fall outside of the majority or consensus group (beyond 10 points from the average KAI score of the group), including the most adaptive and most innovative members of a problem-solving team (Kirton, 2011)

Bridging: “Reaching out to people in the team and helping them to be part of it so that they may contribute even if their contribution is outside mainstream, as for any AC³” (Kirton, 2011, p. 247).

Coping: Behaving (problem solving) outside of one’s preferred style, either more adaptively or more innovatively. Coping is learned and may be required for a certain intensity (distance from preferred style) and duration (amount of time) (Kirton, 2011).

Deutero-learning: Transcends single- and double-loop learning as this learning process aids organizational members in learning how to learn by challenging one’s existing learning frameworks; also referred to as triple-loop learning (Argyris & Schön, 1996).

Double-loop learning: Learning that results in changes to an organization's underlying norms, assumptions, or policies as a result of questioning or challenging existing frameworks in order to resolve a problem (Argyris & Schön, 1996).

Espoused theories: A theory of action, which is used to justify, explain, or otherwise explicate a specific pattern of activity (Argyris & Schön, 1996).

Information: A commodity capable of bringing about knowledge that signals the opportunity for learning based on past experiences and current information (Nonaka, 1994).

Innovation: A preference for effecting change by first altering the structure of the problem in order to generate a resolution; this preference may result in many, risk-tolerant ideas that include a wider variety of perspectives to solve a problem. This preference is in contrast to an adaptive problem-solving style (Kirton, 2011).

Knowledge: "justified true belief" (Nonaka, 1994, p. 15)

Learning frameworks: Mental models that provide a guide for processing information and constructing knowledge within a specific context (Fiol & Lyles, 1985; Hayes & Allinson, 1998; Lyles, 2014; Nonaka, 1994).

Learning: Acquiring, processing, and storing information that results in action or change; both a product and a process (Argyris & Schön, 1996).

Mental model: Individual frameworks that support the integration of new or changing information into an image of how the world works (Senge, 1992).

Organization: A "system that 'processes' information or 'solves' problems" (Nonaka, 1994, p. 14) by engaging "a set of explicit and implicit rules which prescribe

the way members behave” (Hayes & Allinson, 1998; p. 848; Swieringa & Wierdsma, 1992).

Organizational learning: A process by which “members of the organization act as learning agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory in use, and embedding the results of their inquiry in private images and shared maps of organization” (Argyris & Schön, 1978, p. 23).

Precipitating event: An event or experience that begins a problem-solving process; “An approaching event that has been missed, but which portends danger to continued success” (Kirton, 2013, p. 12).

Problem solving: A means of detecting a need for change and resolving the perceived novelty by creating a new set of circumstances that better prepares the individual to identify and resolve future novel circumstances (Kirton, 2011).

Problem-solving style: The stable, unchanging ways (manner and style) in which an individual appears to go about solving problems (Kirton, 2011); measured by Kirton’s (1976) Adaption-Innovation Inventory.

Single-loop learning: Learning that results from an error-detection-and-correction process that aims to reduce or eliminate the occurrence of the error; systems, policies, and procedures are not changed as a result (Argyris & Schön, 1996).

Theories-in-use: A policy, procedure, or system that is executed in compliance that is enacted through structured, rule-governed behavior of its members as observed by others (Argyris & Schön, 1996).

Summary

This introductory chapter provided background information that underpinned the study. This sequential explanatory mixed methods study of two Midwestern companies examined the influence of individual problem-solving style on four factors that comprise organizational learning: (a) Managerial Commitment; (b) Systems Perspective; (c) Openness and Experimentation; and, (d) Knowledge Transfer and Integration (Jerez-Gómez et al., 2005). Additionally, the relationship between problem-solving style and the catalytic and inhibitory variables that contribute to the engagement of various organizational learning typologies for were examined. This chapter also provided clarification regarding the scope of this research study, as well as an introduction of conceptual, theoretical, and methodological frameworks. Lastly, this introduction presented central assumptions, limitations, and definitions of key terminology.

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Catalyzing organizational learning: A mixed methods study of the relationship between problem-solving style and organizational learning capability

Abstract

Problem solving and organizational learning have been the focus of research and discussion for decades, however one connection between the two processes, specifically individuals' problem-solving styles and organizational learning capability, has not previously been empirically tested. This mixed methods study provides evidence of a weak relationship between problem-solving style and organizational learning capability, and offers insights into the experiences of more adaptive and more innovative problem solvers with high organizational learning capabilities. Additional research is needed to advance understanding of the influence of cognitive diversity and mediating factors that contribute to organizational learning.

Introduction

The relationship between problem solving and learning—at the individual and organizational levels—lacks empirical clarity and has been described as both “disparate” and “adjacent” (Hayes & Allinson, 1998, p. 847). However, both processes are essential to advancing organizations in a knowledge management economy. Organizational approaches to knowledge management have targeted three broad methodologies: (a) identifying important knowledge that necessitates management, (b) technical infrastructures to manage said knowledge, and, less frequently, (c) a human infrastructure that supports and sustains these initiatives (Cross & Israelit, 2000). As Davenport (1997) has suggested:

People turn data into information, and that's what requires some unit of analysis. And no matter how simple the information entity—price, revenue, customer, year—somebody is bound to disagree with your definition of it. Information is also much harder to transfer with absolute fidelity... *Knowledge* is information with the most value and is consequently the hardest form to manage. It is valuable precisely because somebody has given the information context, meaning, a particular interpretation; somebody has reflected on the knowledge, added their own wisdom to it, and considered its larger implications. (p. 9)

Davenport's (1997) assertion suggests the individual's role in learning and problem solving, by way of information and knowledge management, must be elevated and explored more fully. Cross and Israelit (2000) have concurred, stating: "To truly leverage knowledge, we must work with the subjective nature of learning and the idiosyncrasies of all those people we find in organizations—a task requiring greater attention to individual and social processes of learning in organizational settings" (p. viii). Assertions regarding the influence of individual-level cognitive style must first be explicated, as literature suggests the identification of problems and threats, as well as the structure of shared mental models for knowledge creation and learning, are influenced by individual problem-solving style and the resulting cognitive climate (Hayes & Allinson, 1998; Kirton, 2011; Lyles, 2014).

Problem-solving, defined by Kirton (2011) as a means of detecting a need for change and resolving the perceived novelty by creating a new set of circumstances that better prepares the individual to identify and resolve future novel circumstances, is considered the highest form of individual cognition, resulting in learning as one responds

to a stimulus or precipitating event that necessitates change (Gagne, 1959). Thus, the embedded processes within the constructs of learning and problem solving offer parallels that contribute to the understanding of the individual level cognitive process, and lends insight into the ways in which knowledge and experience are shared in an effort to create change. Swieringa and Wierdsma (1992) have argued that collective learning, or the process by which learning transcends individual thinking and becomes organizational, leads to collective change. Furthermore, Lyles and Schwenk (1992) have conjectured that individual thinking and cognitive processing, including the development and utilization of knowledge structures, contributes to organizational-level strategies that aid in defining the problem and the development of strategic resolutions; integral aspects of the problem-solving process. Conceiving of problem solving as a learning process in which resolutions lie within the “input-process-output” sequence of nested information processing, researchers and practitioners must fully understand the variables that catalyze and inhibit organizational learning (Nonaka, 1994, p. 14).

Kirton’s Adaption-Innovation (A-I; Kirton, 2011) theory provides a lens by which to examine problem-solving style, or an individual’s preferred way of engaging in the problem-solving process (Kirton, 2011). Both learning and problem-solving processes are underscored by individual-level characteristics that distinguish various and often predictable approaches to the evaluation and use of information that may be used to define or resolve environmental challenges and opportunities. However, the extent to which an individual’s problem-solving style conduces to organizational learning has yet to be empirically studied.

Hayes and Allinson (1998) have suggested that single-loop learning, characterized

by a process of error detection and correction that results in the replacement or modification of current policies, procedures, etc. in order to address the problem (Argyris & Schön, 1996), may be activated by doing things better. Kirton (2011) theorized this more adaptive approach affords individuals with a more adaptive cognitive style an advantage in exploiting this form of organizational learning. Alternatively, Hayes and Allinson (1998) have proposed that double-loop learning, or the process of error detection and correction defined by inquiries that challenge the core pillars of the organization—values, assumptions, beliefs, and purpose (Argyris & Schön, 1996)—may be catalyzed more effectively by doing things differently or doing different things, indicating that a more innovative problem solver may engage this typology of organizational learning more effectively than a more adaptive problem solver.

Double-loop and deuterio-learning—both conceived of as complex, multi-step learning processes, beyond the routine error detection and correction of single-loop learning—are observed with less frequency and duration in many organizations, as the social, environmental, and leadership factors that promote and inhibit these typologies of organizational learning require dedicated effort over time. As these forms of organizational learning afford institutions a competitive advantage in today's global marketplace, the role of cognitive style in catalyzing and/or inhibiting organizational learning remains unclear.

A sequential explanatory mixed-methods study of two Midwestern companies was utilized to examine this theorized relationship between individual problem-solving style and organizational learning (Hayes & Allinson, 1998). The analysis of quantitative data provides insight regarding the relationship between the two theories at the individual

and organizational levels, and informed the development of an interview protocol that explored the experience of problem solving and learning of more adaptive and more innovative participants in both companies.

Purpose and Objectives

The purpose of this study was to determine the relationship between individual's acting as an agent of change (denoted as "AC") given his/her preferred problem-solving style and organizational learning capacity, as well as the experience of individuals involved in problem-solving efforts at two Midwest companies. The following objectives guided this research effort:

1. Describe the demographics of the two companies, their employees, and aspects of cognitive diversity within each organization engaged in a change process.
2. Examine the relationship between problem-solving style and organizational learning capacity.
3. Determine what role AC²s, more adaptive AC³s, and more innovative AC³s play in catalyzing organizational learning.
4. Identify inhibitors of organizational learning, distinguishing differences in inhibitors as experienced by AC²s, more adaptive AC³s, and more innovative AC³s.

Literature Review

Adaption-Innovation Theory

A-I theory assumes that all people are creative and that all people solve problems; however, the diversity of problem-solving style—differences in the way people perceive problems, engage structure and rules in the process of solving problems, and manage

individual differences during collaborative problem-solving efforts—provides a novel lens through which to examine the process of learning and change within an organization. Kirton (2011) has defined problem-solving style as the stable, preferred way in which a person conceives of a problem, and proceeds to the generation of a solution or resolution, which varies as individuals engage more adaptively or more innovatively per their problem-solving style. Kirton (2011) has highlighted many different traits that are associated with problem-solving style, including “risk-taking, dogmatism, tolerance of ambiguity, extraversion, conservatism, flexibility... but excluding such traits as anxiety, neuroticism, or (an)other element(s) of cognitive affect” (p. 6). This argument suggests that problem-solving style is a continuum that can be described at the level or depth of a “dimension of personality” (Kirton, 2011, p. 6). As such, A-I theory distinguishes problem-solving style as a variable separate and independent of level, or intelligence, as well as problem-solving processes and techniques (Kirton, 2011).

A-I theory distinguishes adaption as “first agreeing on the structure in which the problem exists and then utilizing the structure to develop a solution, which in turn alters the original structure” (Friedel, 2014, p. 4). The resulting change of the structure or system is often aimed at making the situation or product better (Kirton, 2011).

Innovation, alternatively, may be described as solving a problem by “altering the cognitive structure to develop a solution, which provides space for the structure to be developed through refinement and modification” resulting in a solution that makes the outcome different (Kirton, 2011 as cited in Friedel, 2014, p. 66). Those who are more adaptive often utilize preexisting structures as a means of developing a solution, whereas those who are more innovative may prefer to alter the initial structure, rules, and

paradigms in an effort to develop a solution (Kirton, 2011). Table 1 compares individual characteristics of more adaptive and more innovative problem-solvers. Innovation, in the context of A-I theory, does not necessarily mean new, novel, or better, but rather a type of diversity that tends to shift and alter the problem frame in order to develop a solution. The popular definition of innovation, at times, is in contrast to the notion that an idea may be adaptive, but also new and novel.

Table 1

Characteristics of more adaptive and more innovative problem solvers

Characteristics	More Adaptive	More Innovative
Perceived behavior	As perceived by more innovative: Sound, conforming, safe, predictable, inflexible, intolerant of ambiguity	As perceived by more adaptive: Exciting but unsound, impractical, risky, threatening the established system
Problem defining	Tend to accept the problem as defined (i.e. within the paradigm); seek immediate, increased efficiency	Tend to challenge the generally accepted perception of problem, changing the paradigm in order to solve the problem; seek long-term gains rather than immediate efficiency
Solution generating	Often generate few novel, creative, relevant and acceptable solutions aimed at “doing things better”	May produce numerous ideas, not all will be relevant or acceptable to other members of group, aimed at “doing things differently”
Policy formulation	Prefer well-established, structured situations; incorporating new data or events into existing structures aimed at increasing efficiency a strength	Prefer less structured situations; use new data to create different structures or policies as they are often less protective of the current paradigm
In organizations	Essential for the ongoing functions, but in times of expected changes may have some difficulty moving out of their established roles	Essential in times of unexpected, turbulent change or crisis, but may have trouble applying themselves to ongoing organizational demands

Note. From Kirton, M.J. (2013). Characteristics of Adaptors and Innovators (p. 39). *KAI Theory Workbook* (2nd ed.). Chorleywood Herts, UK: KAI Distribution Centre Ltd.

In an effort to measure problem-solving style and provide a means for discussing and understanding this aspect of an individual’s uniqueness, Kirton (1976) developed the Adaption-Innovation Inventory (KAI) as a quantitative measure, assigning respondents a

score along the adaption-innovation continuum. However, one's designation as more adaptive or more innovative along the continuum is relative to the problem-solving group with whom an individual is working (Figure 1). Thus, one's score is interpreted alongside the scores of others within the same group, team, or organization. That is, one's KAI score is relative to others engaged in common problem-solving efforts when considering if one is more adaptive or more innovative, even though one's problem-solving style is stable over time. In the context of a specific problem-solving team, an individual may be perceived as more adaptive. However, when working with another team, the same individual may be perceived as more innovative depending on the preferred problem-solving style of others. Understanding this positioning, as well as one's preferred style in relation to the more adaptive or more innovative nature of the problem to be resolved, is essential to leveraging the benefits of cognitive diversity within problem-solving teams. The non-pejorative nature of A-I theory affirms that neither adaption nor innovation is more valuable; both are necessary to identify and solve the array of problems facing organizations today (Kirton, 2011).

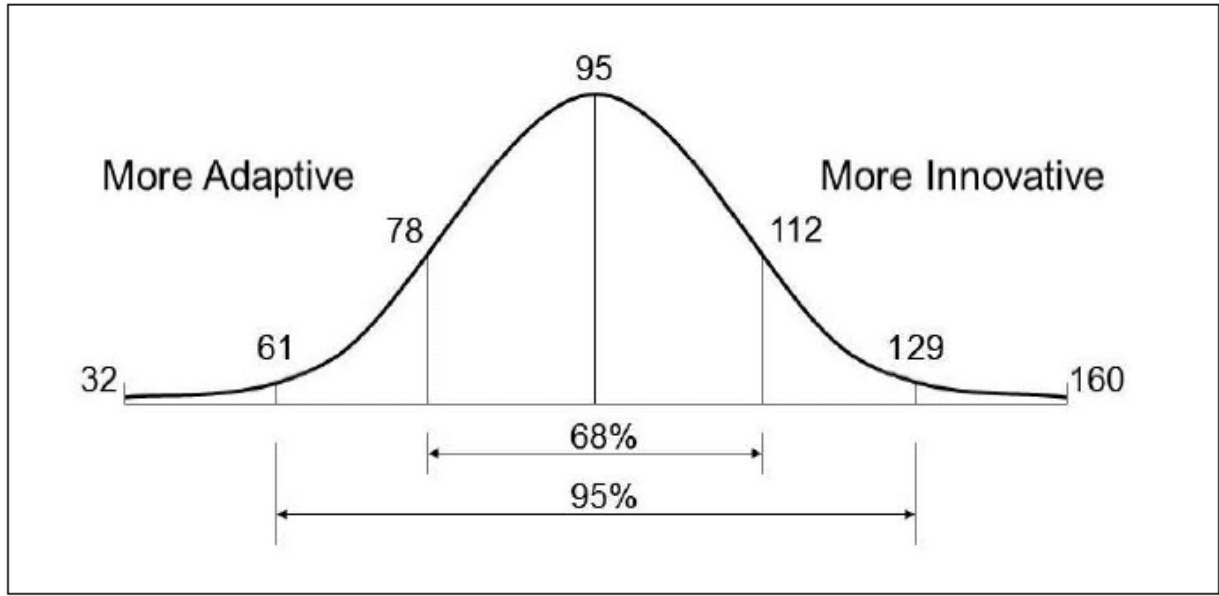
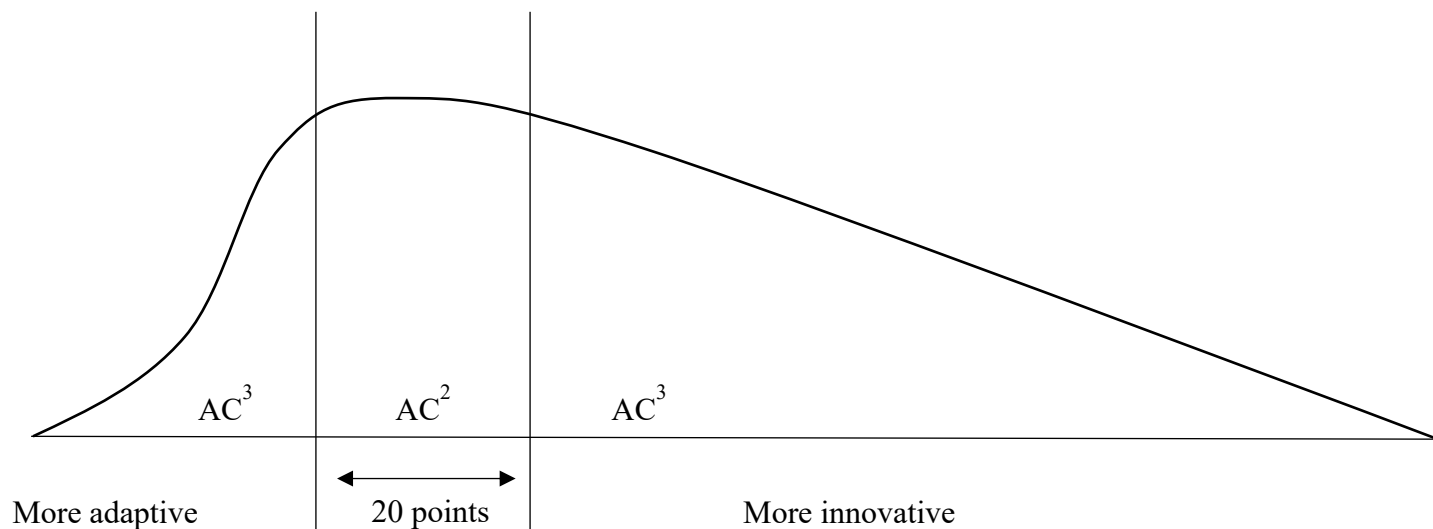


Figure 1. Theoretical distribution of KAI scores along the continuum from more adaptive (left) to more innovative (right) for the general population. From The value of adaption and innovation as a function of diversity (p. 69), by C. Friedel, In N. Erbe (Ed.) *Approaches to managing organizational diversity and innovation*, Hershey, PA: IGI Global. Copyright 2014 by IGI Global.

Agents of Change. Kirton (2011) describes all humans, and thereby all problem-solvers, as “agents of change”, denoted as AC¹s. When individuals join a problem-solving team, they are each additionally described as either an AC²s or AC³s based on their respective KAI score: KAI scores that fall within a 20-point range (± 10 points from the mean score of the group) are considered to be members of the majority or consensus group, notated as AC²s. Members of the problem-solving team outside of this 20-point range, notated as AC³s are those who are more adaptive or more innovative than the consensus group. These individuals are often engaging in coping behaviors when working with the consensus group, which are strategies that allow an individual to participate in productive problem-solving activities utilizing an approach that is not their preferred problem-solving style in order to maintain membership with the group (Kirton, 2011) (Figure 2).



*Figure 2: Consensus group (AC²s) and AC³s along the KAI continuum. From *Adaption-Innovation In the Context of Diversity and Change* (p. 230), by M.J. Kirton, 2011, New York: Routledge. Copyright 2007 by M.J. Kirton.*

As such, AC³s are naturally less comfortable in the context of the team due to the difference in their preferred process for engaging in problem-solving behaviors (Kirton, 2011). An AC³'s cognitive difference “allows them to specialize in those tasks they naturally prefer and which the consensus group does not” (Kirton, 2011, p. 231). Thus, their value within the problem-solving team is apparent; however, due to poor integration within the group and the cost of managing diversity, AC³s often experience discomfort and require additional effort to mitigate the stress and energy loss due to the gap in problem-solving style. Kirton (2011) notes that power lies within the largest group with “cognitive cohesion”—AC²s—often resulting in further disengagement, discomfort, and retreat of AC³s due to the cost of long-term coping (p. 232).

AC³s are of particular interest to study due to their unique perceptions of problems and possible resolutions. Kirton (2011) suggests that more adaptive AC³s often perceive internal threats that may harm the organization or impede progress toward

shared goals; more innovative AC³s often perceive external threats that may disrupt organizational advancement. Furthermore, AC³s often challenge the thinking, processes, and suggestions of the consensus group (AC²s), and relevant literature suggests that AC³s may play an important role in knowledge creation and organizational learning, namely double-loop and deuterio-learning (Hayes & Allinson, 1998; Swieringa & Wierdsma, 1992). Understanding the role of AC³s in catalyzing or inhibiting organizational learning may assist managers in their development of diverse teams, as well as the development and modification of structures and systems that are used by teams as they attempt to resolve complex organizational problems.

The Paradox of Structure. Structures and systems that give organizations parameters for operating, are perceived differently by the more adaptive and more innovative in their problem-solving efforts. Kirton (2011) describes the paradox of structure as “at one and the same time, both limiting and enabling” (p. 4). This paradox applies to the environmental structures in which problems must be solved, as well as the more adaptive and more innovative structure that is problem-solving style. While the development of structures is guided by one’s preferred problem-solving style, the nature of the problem to be solved influences the implementation of physical structures.

Structures are always both enabling and limiting, and are perceived differently by more innovative and more adaptive problem solvers; more innovative members of the problem-solving team may identify structures as more limiting, setting them aside in order to engage in the problem-solving process, whereas more adaptive problem solvers may suggest that structures are enabling and seek to utilize them in the problem-solving process (Kirton, 2011). Kirton (2011) speaks to this directly stating, “There is an

undoubted need for the individual to have sufficient stability of physical and mental structure to create and maintain an integrity of identity, yet have the means to respond successfully to ever-changing needs and an ever-changing environment” (p. 127). Noting the differences inherent to adaptors and innovators, Kirton (2011) concludes:

Adaptors cannot problem solve in a structure so tight that novelty cannot intrude – in this universe there is no such state as ‘no change.’ Innovators cannot dispense with all structure, as without it they would not be able to think – in this universe structure is ever-present. (p. 132)

Furthermore, he asserts:

Adaptors, for example, are liable to produce solutions which reinforce the paradigm [structure], although it may be modified by refinement or extension; innovators are more likely to produce solutions which threaten the paradigm and in some cases... help bring about a paradigm [structure] shift. (Kirton, 1980, p. 214)

Kirton’s claims illuminate the importance of understanding and managing cognitive diversity, as well as the environmental structures that support and inhibit problem solving and learning; the consequences of mismanagement of these variables (i.e. too little cognitive diversity, inflexibility of internal structures, limited resources that constrain problem-solving efforts, etc.) may result in more complex problems that divert resources away from the problem in need of resolution.

Problem A vs. Problem B. Effective problem solving is predicated on an agreement to collaborate, followed by agreement regarding the process, and then the primary problem to be solved, or Problem A. Kirton (2013) suggested Problem B is,

“any problem that impedes progress towards [a] resolution to Problem A” (p.12) and are often indicative of personal criticism or resentment among team members. Problem B is formed any time you have at least two people solving problems together, and include, but are not limited to, aspects of diversity (i.e. ethnicity, gender, power, socio-economic status, etc.), environmental distractions, as well as differences in cognitive style.

Problem B, regardless of their nature or origin, divert resources from the efforts to resolve Problem A. In terms of cognitive style, Kirton (2011) argues:

Adaptors are thought notorious by the more innovative for insisting on the resolution of Problem B before they care comfortable in solving the main task. If this does not happen readily, they are liable to exert more and more pressure for conformity in an increasingly wide area of operations. Equally notoriously for the more adaptive, innovators are liable to threaten to fracture the team with personally held diverse perceptions of the problem and searches for solutions. They also seem to risk abandoning the team in the hope of finding an unlikely solution around which they might then try to re-energise the team – however much its members may doubt its potential for success. (p. 205)

Problem B is pervasive; however, may often remain unidentified. As a result, resources—both in terms of time and money—as well as the coping capacity of those engaged in the problem-solving effort are often exhausted. Leaders engaged in problem-solving and change management must continually scan the environment for potential threats that may impede the problem-solving process, as well as engage structures and resources to advance organizational goals effectively.

Organizational Learning

Learning, often reviewed at the individual level, becomes organizational “when its [organizational] members learning for it, carry out on its behalf a process of inquiry that results in a learning product,” and the learner chooses to act as an agent of the organization (Argyris & Schön, 1996, p.11). In other words, learning at the individual level necessitates a sense of identity between employees and stakeholders, and the organization; an ongoing process in which stakeholders attempt to know the organization and to know themselves in the context of the organization by way of reflexive inquiry (Argyris & Schön, 1978). This evolving understanding of self and identity within the organizational structure serves as a frame for exploring the individual’s perspective and role in organizational learning.

Linking Individual and Organizational Learning. Learning theories abound, representing various fields from psychology and sociology to education and management, affirming the complexity of individual learning and the individual’s role in group or organizational contexts. Most scholars concur that learning is comprised of two levels: operational learning, or the acquisition of knowledge that, when applied, suggests an ability to act (know-how), and conceptual learning, or the ability to articulate a conceptual understanding of an event or experience (know-why) (Kim, 1993). This framework is represented in theories developed by Kolb (2014), Bandura (1977), and Argyris and Schön (1978), suggesting both operational and conceptual learning are vital for individual learning to occur.

The aggregating mechanisms that link individual and organizational learning have garnered less cohesion among learning theorists, however. The development of mental

models, or individual frameworks that support the integration of new or changing information into an image of how the world works (Senge, 1992), are essential to individual learning, as well as the scaffolding of individual learning to a collective group as those models become shared. Shared mental models influence an individual's know-why and know-how, creating the linked human infrastructure needed to support collective or organizational learning. Additionally, scholars assert that leadership, knowledge management systems (technical infrastructures), the interactions between individuals in the learning environment (with a primary emphasis on the socialization of perceived problems and novel solutions), and the organizational culture all influence the ways in which individual learning is merged and embedded within the fabric of the organization more broadly (Argote, 2011; Cross & Israelit, 2000; Lyles & Schwenk, 1992).

Lastly, individual and environmental factors, such as motivation, reward, and social contexts must be taken into account as variables that influence learning at the individual and organizational levels, to include the resources available to navigate the aforementioned complexities. These factors begin to explicate the truly dynamic nature of learning for individuals and as these theories apply to the collective learning of nonhuman entities (Argote, 2011; Argyris & Schön, 1996; Dodgson, 1993; Kim, 1993).

Organizational Learning Theory. Argyris and Schön (1996) articulate a schema for organization learning, which includes “[a] informational content; [b] a *learning product*; [c] a *learning process* which consists in acquiring, processing, and storing information; and, [d] a *learner* to whom the learning process is attributed” (p. 3). According to Argyris and Schön (1996), the use of this schema is conducive to engaging

three types of productive (as opposed to dysfunctional, pseudo, or limited) organizational learning:

1. *organizational inquiry*, instrumental learning that leads to improvement in the performance of organizational tasks;
2. inquiry through which an organization explores and restructures the values and criteria through which it defines what it means by improved performance; and
3. inquiry through which an organization enhances its capability for learning of types (1) or (2). (p. 20)

Argyris and Schön (1996) clarify, “The learning products of organizational inquiry may take forms, all of which, to qualify as learning must include evidence of a change in organizational theory-in-use [representative of actual behavior, as opposed to espoused theories that described intended behavior]. Often such changes are mediated by lessons drawn from inquiry” (p. 17). Argyris and Schön (1978) describe the process and levels of learning more fully:

Organizational learning involves the detection and correction of error. When the error detected and corrected permits the organization to carry on its present policies and achieve its present objectives, then that error-detection-and-correction process is single-loop learning. Double-loop learning occurs when error is detected and corrected in ways that involve the modification of an organization’s underlying norm, policies, and objectives. (p. 2)

When learning is engaged using Model I, or single-loop learning, errors are corrected and new theories-in-use are engaged to modify, and in some instances, replace, mental

models (Argyris & Schön, 1996). Model II, or double-loop learning, is rarely achieved and difficult to measure, and necessitates inquiries that challenge the core pillars of the organization—values, assumptions, beliefs, and purpose (Argyris & Schön, 1996).

Productive learning, however, does not always result from inquiry; Argyris and Schön (1996) refer to near misses as occurrences in which “individuals’ inquiry leads to both new understandings and action but remains outside the stream of distinctively organizational activity and produces no change in organizational theory-in-use” (p. 17).

The complexity of organizational learning requires the development of individual and institutional capacities for collective learning and change, mediated by leadership that embraces ambiguity and deep engagement, in an effort to bring the organization’s mission to fruition.

Inhibitors of Learning. Fiol and Lyles (1985) describe four contextual factors that inhibit organizational learning:

1. *Culture*: An organization’s culture comprises shared beliefs, norms, and values that influence individual behavior and learning, as well as the organization’s ability to integrate individual learning at an organizational level.
2. *Strategy*: Strategy creates the boundaries for learning and decision making, and a context for perceiving problems, opportunities, and threats within the environment.
3. *Structure*: Although structure is an outcome of learning, the organization’s structure plays a central role in determining the process that enable and limit learning to transpire. As such, the authors recommend decentralized structure

and increased flexibility to allow individuals to adapt and take on new mental models, beliefs, and processes.

4. *Environment*: The complexity of internal and external environmental forces can easily destabilize the necessarily flexible and stable context in which learning can occur.

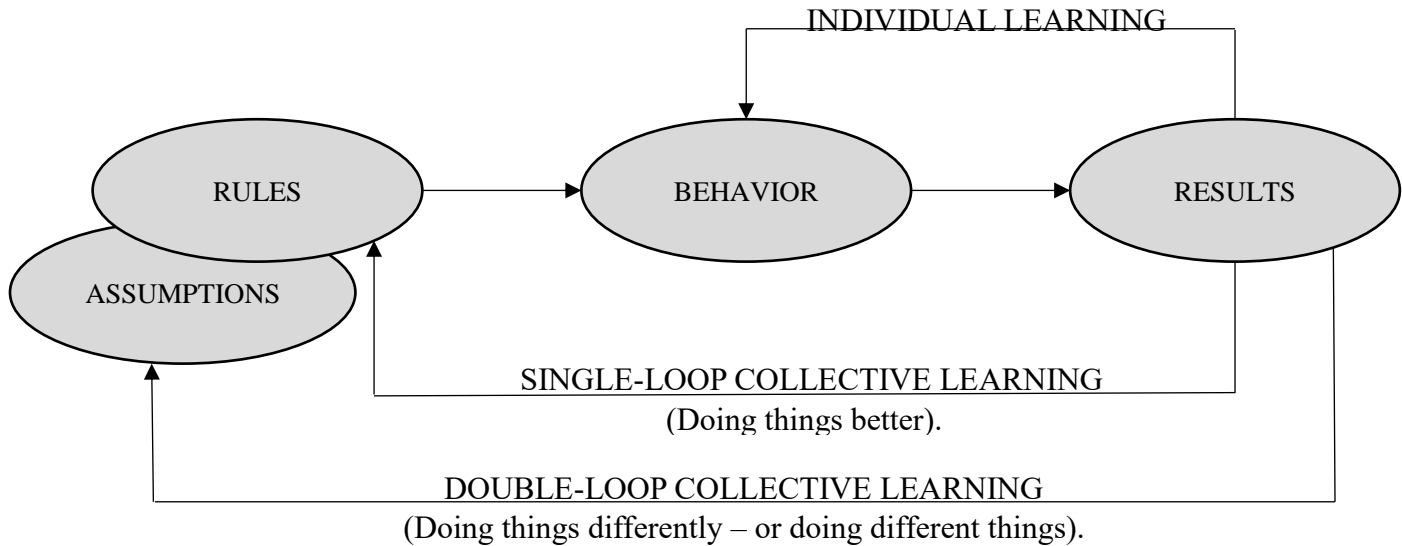
These factors create a unique set of tensions, or stressors, that both enable and limit learning. This provides a relevant point of theoretical connection between AI theory and organizational learning, and responds to Dodgson's (1993) call for more thorough study of the relationships between culture and individual and organizational learning.

Theoretical Connections. Hayes and Allinson (1998) posit that individual problem-solving style may be a contributing factor in the process by which individual-level learning becomes organizational. The authors argue:

Cognitive style influences how people process the information that enables them to interpret changes in situations, assess the consequences of their own and others' actions in situations, and use this understanding to refine or radically redefine their subjective theories or mental models of how the world, or that part of their world that immediately concerns them, operates. (Hayes & Allinson, 1998, p. 851)

Hayes and Allinson (1998) further asserted that a lack of empirical data to evaluate these claims is available, supporting the need for further research to determine the extent to which cognitive style can be applied to the theory of organizational learning, as conceived by Argyris and Schön (1996). Figure 3 depicts Hayes and Allinson's (1998) interpretation of the influence of adaptation and innovation within the context of

organizational learning, establishing the framework to support a theorized relationship between cognitive style and organizational learning. Hayes and Allinson's (1998) figure specifically utilizes terminology that is central to A-I theory in describing and defining cognitive style; this level of specificity in the author's theoretical connection provides a clear opportunity for the exploration of a relationship between cognitive style as defined by Kirton (2011) and organizational learning typologies (Argyris & Schön, 1996). As more innovative problem solvers often challenge, set aside, or change organizational structures, including organizational assumptions such as policies, purpose, vision, values, and norms, Hayes and Allinson (1998) suggest these behaviors may lead to double-loop learning. Conversely, more adaptive problem-solvers tend to prefer problem solving within the structures and boundaries previously established, thus are less likely, in theory, to challenge core principles that govern and guide the organization. However, the model developed by Hayes and Allinson (1998) has not yet been empirically tested.



*Figure 3: Integrating adaption and innovation into an organizational learning context. Adapted from Cognitive Style and the Theory and Practice of Individual and Collective Learning in Organizations (p. 849), by J. Haynes & C. Allinson, 1998, *Human Relations* 51(7). Copyright 1998 by The Tavistock Institute.*

Methods and Analysis

The target population for this study consisted of employees ($N = 397$) from two Midwestern companies engaged in organizational change efforts. This study utilized a sequential explanatory mixed methods design (Creswell & Plano Clark, 2011).

Participants completed a 16-item demographic survey, followed by a 16-item organizational learning capability instrument (Jerez-Gómez, Céspedes-Lorente, & Valle-Cabrera, 2005); a third-party consulting firm provided KAI scores, with consent from participants, in the form of data-on-hand. Semi-structured interviews were conducted with 16 participants during the qualitative phase of the study.

Quantitative Data Collection

KAI. Kirton's Adaption-Innovation Inventory (KAI) is a psychometric tool which measures problem-solving style, also referred to as problem-solving style (Kirton, 2013).

The KAI assessment contains 32 assessment items and provides a total score scale ranging from 32-160 (Kirton, 2009). To complete the KAI, participants were asked to score each item on a line representing the continuum from “very hard” to “very easy” via the online assessment administered by a third-party consulting firm. KAI has an internal reliability coefficient range between .84 to .89, indicating good reliability among questions in this scale (Kirton, 2013).

KAI contains three summed construct scores, or sub scores, which provide additional insight into one’s preferred problem-solving style. These subscales include: Sufficiency of Originality (SO), describing idea generation; Efficiency (E), describing problem solving methodology; and Rule/Group Conformity I, describing the management of social structures (Kirton, 2013).

Organizational Learning Capability. The organizational learning capability instrument includes 16 items with response options on a Likert scale from one to seven, with one representing “strongly disagree” and seven representing “strongly agree” (Jerez-Gómez et al., 2005). The assessment includes four summed dimensions:

- (1) Managerial Commitment: Recognition of the importance of learning by managers and leaders, and the development of a culture that promotes the acquisition, creation, and transfer of knowledge as paramount, both in terms of strategy and as a fundamental value;
- (2) Systems Perspective: Developing a shared identity through mental models, language, and an emphasis on relationships that contribute to the achievement of shared organizational goals;
- (3) Openness and Experimentation: A commitment to diversity and exploring

novel ideas, with an emphasis on individual knowledge being renewed and expanded, as well as tolerance for controlled risk-taking and learning from one's mistakes; and,

(4) Knowledge Transfer and Integration: Simultaneous transfer and integration of information between individuals and throughout an organization through social engagement, systems, and processes (Jerez-Gómez et al., 2005).

The organizational learning capability instrument has an internal reliability coefficient range between .72 and .82, and a Cronbach's alpha of .88 for the whole scale, indicating good reliability among questions in this scale (Jerez-Gómez et al., 2005).

The measure was administered via an online survey provided to participants by email.

Descriptive statistics were used to describe participant KAI scores and group individuals as AC²s (10 points or less from the group's average KAI score), and AC³s (more than 10 points from the group's average KAI score). A bivariate (Pearson) correlation determined the presence of a relationship between KAI score and organizational learning capability existed at a significance of .05

Qualitative Data Collection

Aiming to better understand the experience of participants with high organizational learning capability scores, the mean of the scores was calculated and participants with high scores within one standard deviation from the mean were included in the interview population ($N = 53$). Nine participants from Crown Inc. and seven from Risk Corps. consented to participate; this sample included AC²s ($n = 4$) and more adaptive AC³s ($n = 5$) and more innovative AC³s ($n = 7$). I developed an interview protocol (Appendix C) using *a priori* propositions (Appendix D) and conducted recorded

interviews via phone; interview lengths ranged from 22 to 64 minutes in length.

Recorded interviews were transcribed by an independent transcriber and pseudonyms for each company were chosen at random to ensure the confidentiality of the organizations; participants were identified by a participant number for purposes of confidentiality.

Interviews were transcribed by a third-party and I coded interviews in ATLAS.ti using the constant comparative method of analysis, followed by sorting to identify categories and themes (Corbin & Strauss, 2008).

Results

This sequential explanatory mixed methods study of two Midwestern companies aimed to describe and explain the relationship between individual-level cognitive style and organizational learning capability.

Objective 1: Participant Demographics for Quantitative Data

In partnership with a strategic consulting firm, two Midwestern companies engaged in product development and sales for more than 180 years, collectively, were selected to participate in the study. Both companies previously engaged a third-party consulting firm to provide consultation and highly collaborative, methodical strategies for business performance improvement.

Crown Inc. Crown Inc., a privately-owned materials manufacturing company with facilities in 19 communities, spanning five states, describes itself as being highly motivated as employees seek to continually improve their products and processes in order to exceed customer expectations. With a focus on high-quality product delivery, Crown Inc. emphasizes the importance of a strong, consistent organizational culture, corporate leadership, and systematic processes that support its standing as an industry leader.

In response to a call from employees to clarify how they were expected to approach their work in order to meet the high standards set by corporate executives, a set of core values and guidelines for executing day-to-day tasks were developed by corporate leaders approximately 15 years ago. The implementation of this resource established a new company culture with an emphasis on the people and processes that lead to exceptional products. The ongoing engagement of a third-party strategic consulting firm supports Crown Inc.'s various process improvement efforts, to elevate its status as highly-regarded employer and successful materials supplier.

KAI scores for Crown Inc. ($N = 135$; $n = 116$) ranged from 54 to 147 on the continuum with a mean of 100.59 and a standard deviation of 19.18, indicating a slightly more innovative cognitive climate in comparison to the general population mean ($M = 95$). Organizational learning capability scores ranged from 41 to 111 with a mean of 86.88 and standard deviation of 12.82. Interestingly, corporate leadership was described as being much more innovative, whereas employees engaged in day-to-day manufacturing efforts were described as more adaptive, regardless of their KAI score or position along the continuum; I was able to confirm this perception in consultation with a representative of the third-party consulting firm.

Table 2 provides a breakdown of gender diversity; 111 participants identified as male, four identified as female, and one participant did not respond. The median age of participants was 43.43 years ($SD = 10.00$) (Table 3). Crown Inc. employees self-reported educational attainment (Figure 4), indicating 66 participants have earned a bachelor's degree and 35 have attained an advanced degree. Figure 5 includes frequencies of participants' tenure with Crown Inc., with the highest frequencies reported indicating 31

participants have been employed with Crown Inc. for three to five years, followed by 29 participants who reported being employed by Crown Inc. for six to 10 years. Additionally, 16 participants reported employment with Crown Inc. for 16 years, 15 participants reported employment ranging from 11 to 15 years, 12 participants reported employment ranging from 16 to 20 years, eight participants reported employment ranging from one to two years, and three participants reported employment ranging from 20 to 25 years; one participant reported employment for less than one year and one participant did not respond. Participants represented a wide range of positions and levels of responsibility and they were located at various facilities across the corporation's five-state service area.

Table 2

Frequencies of Crown Inc. gender (n = 116)

Measure/Item	<i>f</i>	<i>%</i>
Male	111	95.7
Female	4	3.4
Non-responders	1	0.9

Table 3

Descriptive statistics for Crown Inc. employees' demographics (n = 116)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	43.43	10.00	116

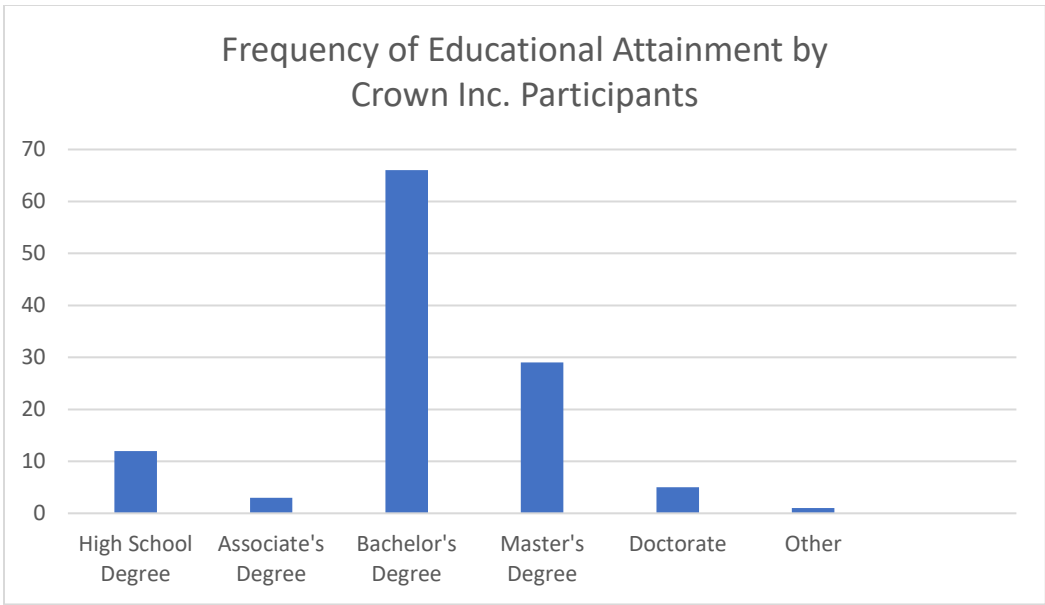


Figure 4, Frequency of educational attainment among Crown Inc. participants.

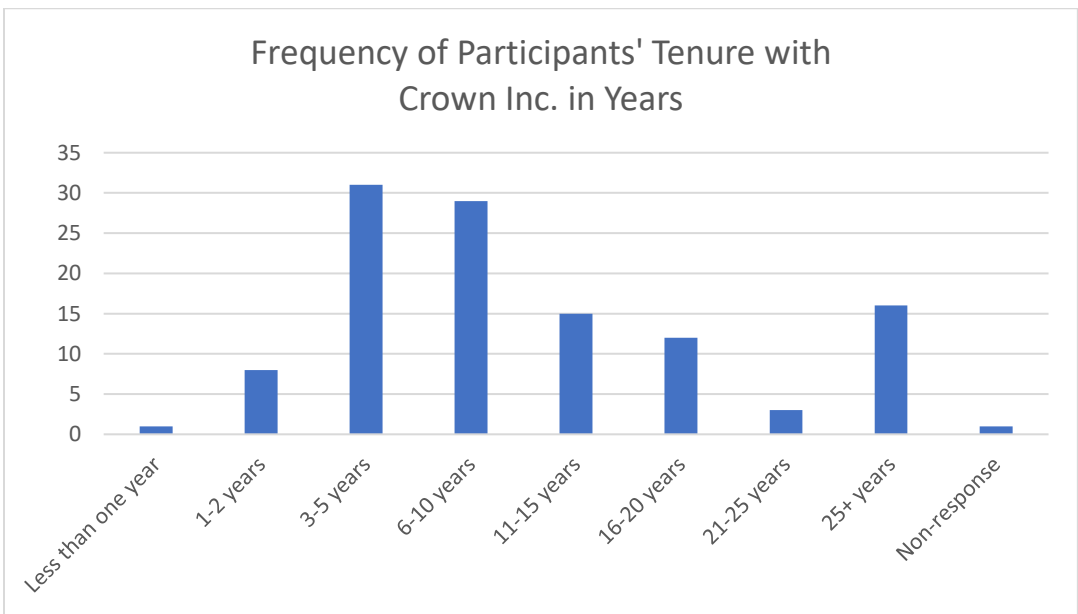


Figure 5, Frequency distribution of participants' tenure with Crown Inc. in years.

Risk Corps. Risk Corps. is a privately held Fortune 500 company that provides various financial and insurance services for individuals and corporations in the United

States. Ranking as one of the top five companies in its field, Risk Corps. purports a commitment to unwavering company values and a history of strong, stable performance across the company's many services.

A transition of a top executive in 2015 served as the catalyst for a change in company culture, including a specific emphasis on putting the customer first in all they do. To augment and assist in managing this change process, Risk Corps. engaged a third-party strategic consulting firm to support various departments and teams within the organization.

KAI scores for Risk Corps. ($N = 262$; $n = 138$) ranged from 52 to 140 on the continuum with a mean of 90.89 and a standard deviation of 15.38, indicating a slightly more adaptive cognitive climate in comparison to the general population ($M = 95$). Organizational learning capability scores ranged from 22 to 110 with a mean of 77.42 and standard deviation of 15.25.

Table 4 provides a breakdown of gender diversity; 100 participants identified as female, 36 identified as male, and two did not respond. The median age of Risk Corps. participants was 39.25 years ($SD = 13.06$) (Table 5). Risk Corps. employees self-reported educational attainment (Figure 6), indicating 77 participants who have earned a high school degree, while 36 have completed a bachelor's degree or higher; 13 participants indicated they completed some other advanced educational program. Figure 7 includes frequencies of participants' tenure with Risk Corps.; the highest frequency reported indicates 32 participants have been employed by Risk Corps. for 25 or more years, while 26 participants reported employment ranging from three to five years, and another 26 participants reported employment with Risk Corps. for less than one year.

Additionally, 25 participants reported employment with Risk Corps. for six to 10 years, 19 participants reported employment ranging from one to two years, and five participants reported employment ranging from 11 to 15 years and 16 to 20 years; no participants reported employment with Risk Corps. ranging from 20 to 25 years.

Table 4

Frequencies of Risk Corps. gender (n = 138)

Measure/Item	<i>f</i>	<i>%</i>
Male	36	26.1
Female	100	72.5
Non-responders	2	1.4

Table 5

Descriptive statistics for Risk Corps. employees' demographics (n = 138)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	39.25	13.06	130

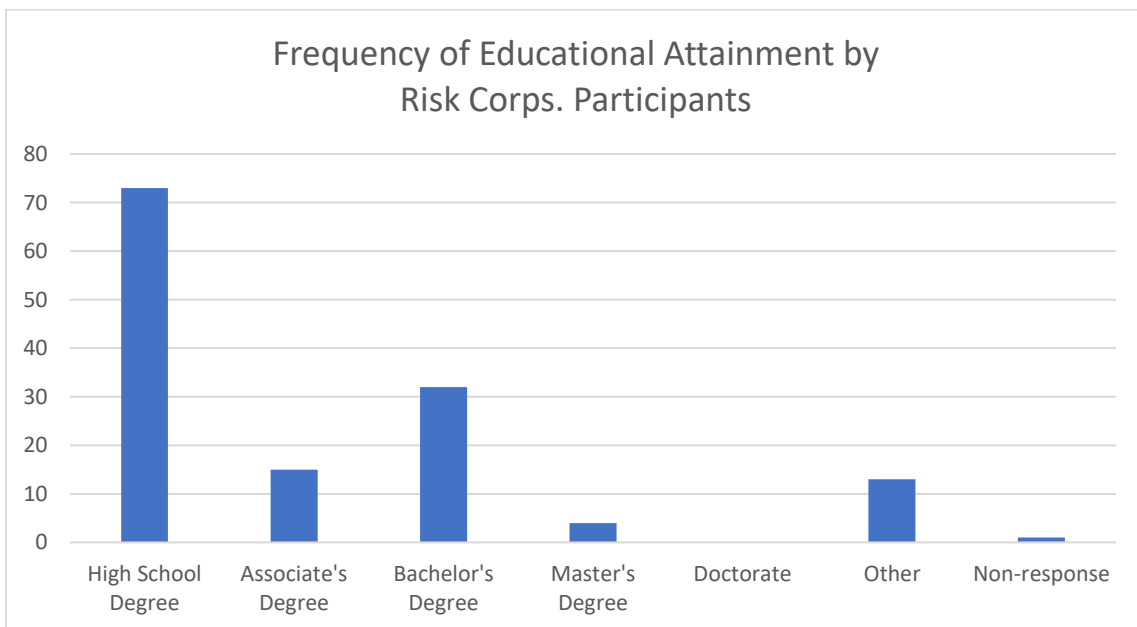


Figure 6, Frequency of educational attainment among Risk Corps. participants.

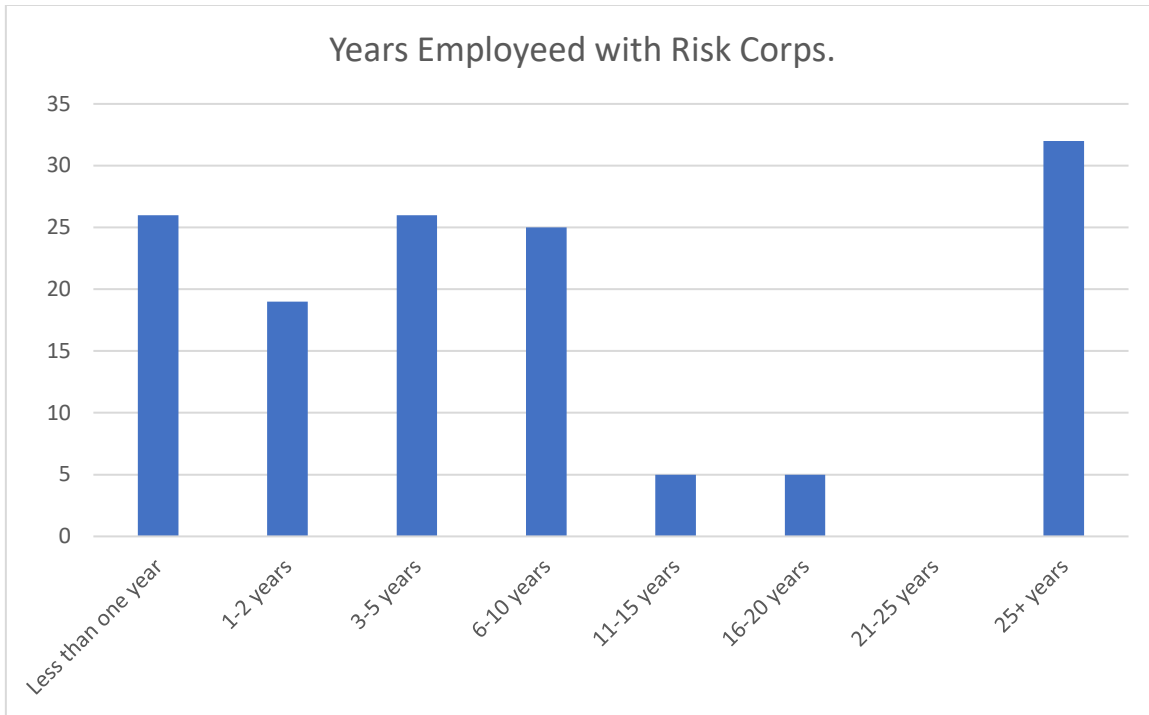


Figure 7, Frequency distribution of participants’ tenure with Risk Corps. in years.

Objective 1: Participant Demographics (Qualitative Data)

Participants were selected for this portion of the study based on the quantitative data collected previously. Table 6 provides an overview of research objectives, related interview questions, and correlating themes. Findings in support of Theme 1—Corporate expectations that create a clear, concise shared mental model for employee behavior and decision making provides a foundation for effective problem solving and change management—are described for each organization. Demographic data for these samples are presented herein.

Table 6

Alignment of Research Objectives, Interview Questions, and Qualitative Data Themes

Research Objective	Related Interview Questions	Qualitative Themes
RO1: Describe the demographics of the two companies, their employees, and aspects of cognitive diversity within of each organization engaged in a change process.	How would you describe the work environment and the organizational culture at [Company Name] and more specifically, within your department or facility?	T1: Corporate expectations that create a clear, concise shared mental model for employee behavior and decision making provides a foundation for effective problem solving and change management.
RO2: Examine the relationship between cognitive style and organizational learning capacity.	<p>Does your team have a set of agreed upon values that guide your work together?</p> <p>Tell me about any group norms or rules, written or unwritten, that are in place both organizationally for [Company Name], as well as within your facility.</p> <p>How are rules and group norms developed, and by whom? Have they been adapted or changed, during your tenure or otherwise?</p> <p>Do you perceive you and your team have a common system for utilizing symbols or shortcuts that help you to understand and evaluate problems in the workplace?</p> <p>Do you feel like the group norms and rules, both written and unwritten, are understood and observed by all members of the team? And if not, are there individuals that have</p>	<p>T2: The use of agreed-upon structures and methodologies for problem solving mediates the influence of experience and emotions, establishing a common process in pursuit of a resolution.</p> <p>T3: The development and nurturing of healthy teams prioritizes diversity and engage in interventions that ensure corporate expectations remain at the forefront of employee efforts.</p>

	interpretations that are different than your own?	
RO3: Determine what role AC²s, more adaptive AC³s, and more innovative AC³s play in catalyzing organizational learning.	Does your team have a formal or informal problem-solving process? Think about a particular problem your team has worked on together. Please share your experience working through the problem, using the problem-solving process you described.	N/A
RO4: Identify inhibitors of organizational learning, distinguishing differences in inhibitors as experienced by AC²s, more adaptive AC³s, and more innovative AC³s.	Describe an experience in which someone or something inhibited or was a barrier to asking or addressing “how” and “why” questions? Describe a time when you or someone else may have learned something but didn’t share that learning with the team or with others in the company.	T4: A paradox of structure, resulting from resource limitations, inhibits learning. T5: An expectation of boundary-less collaboration mitigates inhibitors of learning.

Crown Inc. Nine Crown Inc. employees participated in semi-structured interviews ($N = 22$; $n = 9$); Table 7 provides an overview of gender frequencies with most participants reporting to be male. Participants reported their average age to be 43.44 years ($SD = 11.10$) (Table 8). KAI scores ranged from 81 to 130 with a mean of 102.77 ($SD = 18.62$). Based on the mean KAI score of the organization ($M = 100.59$), this sample consisted of two AC²s, three more innovative AC³s, and four more adaptive AC³s. Organizational learning capability scores ranged from 90 to 98 with a mean of 93.44 ($SD = 3.21$). Seven participants reported a bachelor’s degree as their highest level

of educational attainment; one participant reported having completed a master’s degree and one reported completing high school. Their tenure with Crown Inc. ranged from three to five years up to 25+ years with the organization.

Table 7

Frequencies of Crown Inc. gender (n = 9)

Measure/Item	<i>f</i>	<i>%</i>
Male	8	88.8
Female	1	11.1

Table 8

Descriptive statistics for Crown Inc. employees’ demographics (n = 9)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	43.44	11.10	9

Participants were able quickly and easily to articulate the company’s values, describing the company culture and their individual experiences using very similar terms, examples, and descriptive language. Collectively, Crown Inc.’s employees suggested they perceived their colleagues were a family, repeatedly stating, “We’re all in this together.” This sentiment serves as the anchor for other unique cultural aspects of Crown Inc.’s work environment.

Analysis of the interview data concluded that Crown Inc.’s internal processes and procedures served as mediating social and environmental factors in the expression of more adaptive or more innovative problem-solving behaviors. That is, the shared mental models and learning frameworks that enhance organizational learning have been developed and deployed strategically to underpin company-wide initiatives, mitigating

the influence of an individual's cognitive style in obtaining organizational goals and relationship building among diverse team members.

The culture, as described by participants from Crown Inc., suggests that not only do task- and facility-based teams agree on the problem(s) to be resolved—a focus on Problem A—they have agreed on a systematic process for solving problems. As a result of their intentional focus on Problem A, and a culture that includes mediating factors that reduce the influence of Problem B, Crown Inc. has been highly successful in its effort to advance novel products and processes, and remain an industry leader in its field.

Corporate expectations and standards that shape organizational culture have been spelled out in a guidebook that has become a shared mental model among Crown Inc. employees, explicating organizational values and a schematic for making decisions in a fast-paced manufacturing environment. Although this description was repeated by many participants, it was articulated best by Participant 1 as he discussed one of the many ways the guidebook is used in practice when asked for guidance from a colleague, “My answer to them is simply this, ‘Safety, quality, productivity.’ It’s like, ‘Ok, I know what I need to do now.’ And so, that’s one of the mental check sheets that we have.” Safety, quality, and productivity are three of Crown Inc.’s core values, and serve as a mental model for how to proceed in resolving a problem, prioritizing tasks, or allocating resources in response to emerging needs.

Risk Corps. Seven Risk Corps. employees participated in semi-structured interviews ($N = 31$; $n = 7$); Table 9 provides an overview of gender frequencies with most participants reporting to be male. The average age of participants was reported to be 36.57 years ($SD = 15.83$) (Table 10). KAI scores ranged from 76 to 140 with a mean of

101.57 ($SD = 21.57$). Based on the mean KAI score of the organization ($M = 90.89$), this sample consisted of one more adaptive AC³, two AC²s, and four more innovative AC³s. Organizational learning capability scores ranged from 85 to 98 with a mean of 90.00 ($SD = 4.43$). Three participants reported a bachelor’s degree was their highest level of educational attainment, two participants reported having received a high school degree, one participant obtained an associate’s degree, and one participant reported “Other.” Their tenure with Risk Corps. ranged from less than a year up to 25+ years with the organization.

Table 9

Frequencies of Risk Corps. gender (n = 7)

Measure/Item	<i>f</i>	<i>%</i>
Male	1	14.3
Female	6	86.7

Table 10

Descriptive statistics for Risk Corps. employees’ demographics (n = 7)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	36.57	15.83	7

Culturally, Risk Corps. was praised as a good employer, however, their culture was less well defined than Crown Inc., and employees struggled to articulate shared values, norms, and goals aside from their emphasis on a “customer first” focus and daily performance quotas. When compared to the decades-long effort at Crown Inc., change management at Risk Corps. is in its infancy. As such, corporate expectations and cultural guideposts are under development and not yet established as widely-shared mental models.

Risk Corps. participants explained recent changes and their perspectives on company culture, providing unique insights into the evolving landscape within the corporation. Participant 7 explains the recent shift towards collaboration:

When I think... the team has kind of changed a little bit from when I started with the company. It seems to be a lot more open now. There's a lot more conversations, a lot more helping others. You know more, 'Hey let's go to lunch together' type of thing instead of let's just sit in our cubicle and work. And I think that's one of the great changes that Risk Corps. has made in the culture is trying to give people that time to collaborate and get to know each other so that we can work as a team to better ourselves.

While steps have been taken to increase collaboration and employee engagement, Participant 9 shares that little is documented in terms of group norms or team expectations that formally guide employee behavior:

I know the company has a general you know...your employee handbook and that type of thing and as far as the team concept is concerned, you work together as a team to accomplish things and so there really isn't anything documented.

In contrast to the articulation of clear corporate expectations and an emphasis on maintaining the integrity of Crown Inc.'s culture, Participant 13 described Risk Corps.' values in in this way:

Risk Corps. broadly has agreed upon values that we work by and then what we do in our meeting daily, we go over a value and what that means to us, so right now as a team we're focusing on customer focus. But for Risk Corps. broadly, there's a focus on integrity, customer focus, productivity... there's actually a whole list

but I can't read it from here. There's like six or so values that we, Risk Corps., broadly focus on but right now our team is just focusing on customer focus.

Furthermore, Participant 10 provides insight into the physical environment:

Oh, gosh, there's been a lot of changes! Management is a lot different. I mean we used to have like regular business like you know suits and stuff for the culture, and then we kind of went to business casual and now we're even allowed within this last year, we can wear jeans!... I was shocked you know after 38 years or so you know you think, oh my gosh I never thought I would see that.

As reflected in the above quotations, Risk Corps. is pursuing a "customer first" mode of operation and thereby defining their shared Problem A as meeting or exceeding customers' needs. This approach requires a great deal of resource to meet the ever-changing needs and demands of customers, and positions the shared goal or focus of Risk Corps. employees external to the culture and operation of the organization. As a result, the strength of the company culture (i.e. shared values, norms, and goals) may shift over time in response to various internal and external factors, namely the evolving needs of their diverse customer base, individually and collectively. A number of changes have been implemented at Risk Corps., in terms of learning and problem-solving, employees report a more open physical work physical environment and morning meetings or "huddles" have contributed to collective problem-solving efforts and provided a facilitated opportunity to share information and learning.

Objective 2: Relationships between Cognitive Style and Organizational Learning Capability (Quantitative Results)

This study sought to test the relationship between individual problem-solving style (KAI total scores) and organizational learning capability total scores. To examine the relationship between KAI scores and organizational learning capability (as well as subscales for each measure) for participants from Crown Inc., a Pearson's correlation coefficient was calculated (Table 11). There was a weak negative relationship between problem-solving style and organizational learning capability, suggesting that more adaptive individuals in this organization also tended to have greater capability to catalyze organizational learning; this finding does not distinguish the type of learning (i.e. single-loop, double-loop, or deuteron-learning) that may be engaged, but more simply suggests a greater capability to engage in organizational learning. Furthermore, the data suggests that in this organization, more adaptive problem-solvers may be associated with exploiting this capability by engaging organizational learning dimensions Managerial Commitment and Knowledge Transfer and Integration and the KAI subscale Rule/Group Conformity (Cohen, 1998). Individuals with a preference toward adaptive Rule/Group Conformity are associated with contributing to organizational learning at higher levels.

Table 11

Correlation of KAI and Organizational Learning Capability for Crown Inc. (n = 116)

Variable	Organizational Learning Capability Total Score	Managerial Commitment	Systems Perspective	Openness & Experimentation	Transfer & Integration
KAI Total Score	-.207*	-.191*	-.138	-.129	-.246**
Sufficiency of Originality	-.110	-.165	-.005	-.057	-.125
Efficiency	-.138	-.106	-.085	-.114	-.167
Rule/Group Conformity	-.261**	-.184*	-.257**	-.151	-.318**

Notes. * $p < .05$, ** $p < .01$

To determine if there was a difference in group means between AC²s and more adaptive and more innovative AC³s and organizational learning capability for participants from Crown Inc., an Analysis of Variance (ANOVA) was calculated (Table 12). The data revealed no statistical difference in organizational learning capability between AC²s and more adaptive and more innovative AC³s for participants from either company. This finding suggests that organizational learning capability is unrelated to, or independent of, problem-solving style, thus more adaptive and more innovative individuals are each capable of catalyzing organizational learning, but likely in different ways.

Table 12

One-Way Analysis of Variance of Organizational Learning Capability by KAI Score for Crown Inc. (n=116)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	623.49	2	311.75	1.93	.150
Within Groups	18286.82	113	161.83		
Total	18910.31	115			

To examine the relationship between KAI scores and organizational learning capability (as well as subscales for each measure) for participants from Risk Corps., a

Pearson’s correlation coefficient was calculated (Table 13). There was no statistically significant relationship between total KAI scores and organizational learning capability scores. There was a weak positive relationship between KAI subscale Efficiency and subscales Managerial Commitment and Systems Perspective (Cohen, 1998).

Specifically, this relationship may be explained by Risk Corps.’ approach to problem solving, which was articulated by participants in the qualitative strand of this study to include reporting problems to a supervisor for a resolution. In this case, more innovative participants may be associated with exhibiting behaviors reflective of Managerial Commitment, or express a belief in managements’ commitment to learning, innovation, and experimentation depending on their role within the organization, and Systems Perspective, placing a priority on developing shared mental models and relationships that enhance problem-solving systems.

Table 13

Correlation of KAI and Organizational Learning Capability for Risk Corps. (n = 138)

Variable	Organizational Learning Capability Total Score	Managerial Commitment	Systems Perspective	Openness & Experimentation	Transfer & Integration
KAI Total Score	.094	.157	.043	.035	.052
Sufficiency of Originality	.093	.109	-.003	.049	.131
Efficiency	.182*	.248**	.221**	.092	.036
Rule/Group Conformity	-.025	.052	-.043	-.043	-.074

Notes. * $p < .05$, ** $p < .01$

To determine if there is a difference in group means between AC²s and more adaptive and more innovative AC³s and organizational learning capability for participants from Risk Corps., an Analysis of Variance (ANOVA) was calculated (Table 14). The data revealed no statistical difference in organizational learning capability between AC²s

and more adaptive and more innovative AC³s for participants from either company. This finding suggests that organizational learning capability is unrelated to, or independent of, cognitive style, thus more adaptive and more innovative individuals are capable of catalyzing organizational learning, but likely in different ways.

Table 14

One-Way Analysis of Variance of Organizational Learning Capability by KAI Score for Risk Corps. (n=138)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	650.42	2	325.21	1.41	.249
Within Groups	31231.21	135	231.34		
Total	31881.62	137			

Objective 2: Relationships between Cognitive Style and Organizational Learning Capability (Qualitative Results)

Although the quantitative results of this study demonstrate a weak relationship between subscales of organizational learning capability and problem-solving style, the results led to a series of questions that uncovered insights via interviews regarding the experience of participants in collaborative problem-solving environments. While Kirton (2011) asserted that the management of cognitive diversity is essential to effective problem solving and the resolution of Problem A, the systems and structures that allow the value of cognitive diversity to be fully exploited vary and must be implemented successfully amid the complexities of internal corporate culture and external environmental pressures. This study’s findings support that agreed-upon structures and methodologies for problem solving mediate the influence of experience and emotions, establishing a common process in pursuit of a resolution to an agreed-upon problem. Crown Inc. employees articulated various schema—both in terms of mental models and formal processes—that define the problem-solving process. Clarity regarding next steps and how problems are framed and resolved reduces resource allocation (time and money) and enables individuals involved in addressing the problem to anticipate next steps.

Participant 1 described this process:

So, when we get those issues, they're quickly shared amongst us and then you know, we have to go through a quick mental checklist: How big of a pressing problem is this? What do we need to do? And then we can go forward with it. As we do that, we can quickly take something before it gets to be a major crisis and hopefully resolve it so it's does not become too big. And that's one of the things that sort of my job doing is trying to predict out the future and you know my staff is working through the day and you know, making sure that they can see the big picture and not just bogged down with the day to day stuff... The mental check sheet, again, it goes back to the guidebook. The condensed version of the guidebook which can be broken down into what we call, 'Safety, quality, productivity.'...So when we have a problem, we sit down... I've said, my answer to them is simply this: Safety, quality, productivity. It's like, 'Ok, I know what I need to do now.'

Participant 1 described a shared mental model, which is augmented at Crown Inc. by a formal problem-solving process, that effectively enables employees to focus on key priorities, both in terms of the problem at hand and the company's core culture.

By contrast, Risk Corps. participants reported that problems were regularly reported to a supervisor for consideration. Participant 13 described that company's process for solving problems:

I reach out to a specialist and then if they can't help me I go to a supervisor... Cause all of our specialists and supervisors have worked here for a bunch of different years so we all kind of trust them and trust each other to come up with good, good solutions to a problem.

When asked if they experienced barriers to asking questions, primarily “how” and “why” questions, Participant 13 responded:

Usually it’s like the most inhibiting one is when a supervisor’s gone. Currently, my specific supervisor is gone so I either pose questions to my other supervisor or another specialist; the other supervisor tends to be away at lots of meetings which is totally ok. They always, answer the questions later.

These two examples demonstrate the value of shared mental models and a known process for solving problems. The involvement of a supervisor varies in these examples: the responsibility for generating next steps and a resolution lies with the employee faced with the problem at Crown Inc., with the support of shared mental models, and conversely, with a supervisor at Risk Corps.

The implementation of agreed-upon structures for problem solving is exploited when healthy, diverse teams merge the talent and espoused corporate values needed to resolve problems and continue organizational operations to ensure that quality outputs and quotas are met. The emphasis placed on this practice within Crown Inc. resulted in theme three (see Table 6) as a critical outcome of this study. Participants employed by Crown Inc. continually referenced their desire to develop small, cross-functional teams that included aspects of cognitive diversity and experience. Participants also explained their involvement in leadership development efforts, to include their independent efforts to enhance their management skills, as well as their involvement in corporate reading and training programs. These practices afford Crown Inc. the flexibility to exploit the talent of their employees in problem solving efforts. Although interviews with Risk Corps. participants did not include an emphasis on team development initiatives to the same

degree or frequency, the consistent emphasis of these practices by Crown Inc. participants warranted representation of their assertions within this theme.

Objectives 3: Determine what role AC²s, more adaptive AC³s, and more innovative AC³s play in catalyzing organizational learning (Qualitative Results)

As mentioned previously, the quantitative results of this study did not provide compelling evidence of a relationship between organizational learning and problem-solving style, necessitating a deeper understanding of how AC²s and AC³s, as well as those who are more adaptive and more innovative, engage in problem-solving. Due to limitations of this study and the population invited to participate, a theme did not emerge, however several participants provided insights that provide a foundation for further research.

Kirton (2011) has described the differences between AC²s and AC³s, often articulating their positionality on a problem-solving team in terms of power. Participant 9 shared her experience as a more innovative AC³ within Risk Corps., a more adaptive cognitive climate, in a way that demonstrated this critical dynamic clearly:

Well before the CEO shift and then even dial back a few years before we started within our operation doing business transformation work... previous to that I would say I recognized the need for change and tried to do more local change within my team but didn't feel supported at the corporate level or even our operational level to do more. And so, I would say I probably was a little more quiet with my peer group, more quiet just kind of in general because people didn't necessarily, the organization didn't necessarily value the work that my team was doing and so it was kind of like... OK. But as soon as we started the business

transformation work, started leveraging lean concepts to execute change, then, ‘Oh, design our process from the customer’s perspective, eliminate waste... do [not do] things that the customer wouldn’t be willing to pay for’ then I think it was like I needed to be given a little bit of permission...like I needed to be given just a tiny bit of permission by my leader and then subsequent peer group. And then after I was given that, the floodgates were open and it was like I was allowed to think and contribute in a way that I have always wanted to... I almost felt depressed before... Like, we’re not focusing on the right things and we’re not doing the right things, but no one cares when I say that and so I almost got to a point where I was like, ok this isn’t valuable or at least people don’t see it [as] valuable and so I’m just not going say it or do it, whatever. But since we started to shift then I felt like I could leverage that [way of thinking].

Participant 9’s experience is unique in this sample, in part due to her knowledge of and prior experience with KAI; however, this experience is supported by Kirton’s (2011) theory regarding the experience of AC³s—those who are more adaptive and more innovative, alike. From a sense of withdrawal due to a perceived lack of value, to a desire for permission to engage, and purpose when engagement aligned with their problem-solving style, AC³s can provide rich diversity and novel ways of viewing adaptive and innovative challenges when engagement limits the need for coping. As Kirton (2011) has noted,

The AC³s value seems obvious and, in theory, it seems a certainty that prominent, able AC³s must be in hot demand. However, this is not the case, for all too often they are not well regarded, their worth is downgraded, and they are poorly

integrated in the group...The answers lie in the cost of diversity, the comfort derived from a homogenous in-group, and the power exerted by different forms of social climate contrasted with the contrast need to survive in a complex challenging environment. (p. 231)

The case for cognitive diversity and the inclusion of AC³s cannot be overstated, yet is complex and difficult to maintain over time.

AC²s, however, are often best positioned to assume a social role referred to as bridging, or “reaching out to people in the team and helping them to be part of it so that they may contribute even if their contribution is outside the mainstream, as for any AC³” (Kirton, 2011, p. 247). As a social role, bridging requires skill and often companies will employ an expert bridger to decrease the coping required due to cognitive diversity or a perceived gap between the nature of the problem to be resolved and the cognitive climate of a problem-solving team. Although an AC² may be best positioned to support bridging activities based on his/her KAI score, the responsibility of bridging may be assumed by any member of the group and must be the individual’s choice, rather than an assigned obligation. AC²s who participated in this study often indicated their desire to explain something in more than one way. Participant 15 was classified as an AC² due to his KAI score within the slightly more innovative cognitive climate at Crown Inc. and expressed characteristics of bridging with introductions such as, “Well I’ll answer the question in a few ways...” or “Yes and no... it depends.” To further clarify, several participants exclaimed, “Let me say it this way...” and sought confirmation of understanding, “Right? OK?” Bridgers are an important resource in an organization committed to individual and organizational learning. Their awareness, ability to communicate with more adaptive and

more innovative individuals, and often to negotiate with other members of the team to ensure progress toward Problem A remains a top priority for individuals engaged in the problem-solving effort. As a result, cultivating “experts” who are able to assume these social roles may be advantageous in conducting learning.

Objective 4: Identify inhibitors of organizational learning, distinguishing differences in inhibitors as experienced by AC²s, more adaptive AC³s, and more innovative AC³s (Qualitative Results)

Two themes emerged in regards to this research objective that offered insights into the factors that inhibit learning when considered through the lens of cognitive diversity and problem-solving style.

The Paradox of Structure: Resource limitations. Participant 15 described the culture at Crown Inc. as one of “hyper-execution” and seeking continuously to improve. As a result, time and money emerged as two structural factors that limited innovation and sustained adaption. Participant 15 described the paradox of structure in these terms; their knowledge of A-I theory affords the use of language that clearly informs this participant’s perspective:

I just need something that’s going to work now. And so, we’ll come up with a solution that’s more adaptive. It basically takes what we’re currently doing and adjusts it a little bit so we get something in that’s better now that may be temporary or intended as kind of a band aid with a more long-term, permanent better solution down the road. But then the next time the object comes up and we never end up coming back and so we’re left with just that more adaptive solution as opposed to the better long-term solution which sometimes is adaptive, but...

usually it's more innovative. If it takes longer it tends to be more innovative. More outside the box. Outside of what we're currently doing. So... I would say that, that that definitely happens. And that's part of the culture at least that my team deals with that we're... I wouldn't say fighting with, but definitely we work with. Or are conscious of.

This participant clearly articulates the dynamic environment in which adaption and innovation compete in an error-detection-and-correction learning process and resources create structures that often necessitates a choice between two solutions. Crown Inc. has exploited this paradox by employing Six Sigma methodologies (de Mast & Lokkerbol, 2012) in an effort to dedicate resources, namely time and money, to solving intractable problems. In this case, Six Sigma methodologies are an example of a formal decision-making process that informs efficient, effective problem-solving efforts. Six Sigma methodologies focus on data-driven process improvements that enable teams to increase quality and reduce waste and variation (de Mast & Lokkerbol, 2012). Central to Six Sigma methodologies are five interconnected phases characterized by the acronym DMAIC: Define, Measure, Analyze, Improve, and Control (de Mast & Lokkerbol, 2012). These methodologies, which have become shared mental models that inform a shared context and process for problem solving efforts, have enabled Crown Inc. to exploit the various paradoxes of structure (i.e. adaption verses innovation, resources limitations, etc.) in order to engage some of the company's most challenging, systemic problems in search of the best solution.

In regards to the objectives of this study and in the context of the data collected, Participant 15's perspective may further explain the quantitative findings in regards to the

overall relationship between problem-solving style and organizational learning which suggest that more adaptive problem-solvers have a greater capability to catalyze organizational learning. The paradox of structure as described by Participant 15, in this case resource limitations, may become an inhibitor of learning (single- and double-loop), preventing the exploration of more innovative approaches. The learning associated with both the intended (i.e. a viable, long-term solution to the problem at hand) and unintended consequences (i.e. possible solutions to other challenges or problems, including but not limited to revised problem-framing, process improvements, and new mental models) of these approaches. As such, and based on the espoused value associated with deutero-learning, an evaluation of resource allocation and risk associated with non-learning may be warranted. Similar findings from other Crown Inc. participants regarding the paradox of structure, namely time and money, resulted in the development of theme four: A paradox of structure, resulting from resource limitations, inhibits learning.

Boundary-less Collaboration. As study participants described their problem-solving efforts and learning environments, several additional inhibitors of learning emerged. Broadly, when there was a lack of agreement to collaborate and no agreement on Problem A, learning was inhibited as resources were diverted to resolving Problem B. In some cases, this manifested as conflict with people, rather than over ideas at Crown Inc., or due to a lack of personal relationships that allowed trust to mediate the ambiguity and structures that necessitate coping in order to solve problems together.

Most prominently, feelings of inadequacy and fear of failure appeared to deter learning in both organizations and resulted in theme five: An expectation of boundary-

less collaboration mitigates inhibitors of learning. First, Crown Inc. participants conveyed past practices of withholding information or resources in an effort to maintain job security or to avoid an admission of failure. As participant 14 reported, “We used to be that way, we had major processes within the plant that only one or two people knew and they would not share the information they knew. You know, it’s job security at the time.” The sense of threat and uncertainty caused employees to diverge from company culture and compromise their integrity, putting their personal desires above the needs of the team. Participant 4 explained, “I mean, we’ve had people who have made million dollar mistakes and not be fired, but someone who makes a hundred-thousand-dollar mistake and then tries to lie or cover it up is fired, so I mean, it’s, honesty and integrity is our number one guideline.” Furthermore, Risk Corps. participants noted the use of daily metrics to communicate each individual’s performance, and the performance of the teams as a whole. While the intention is to provide quick feedback for employees as a means of improving overall performance, this practice may result in feelings of inadequacy, limiting performance and learning. As participant 10 recalled, “A lot of times we do have like stickers that we put [up]; if we achieve our goal we get a green one. If we don’t for the day, you know, you put a red one up.” This environment may lead to extended periods of single-loop learning as employees attempt to detect and correct errors that result in missed metrics or goals, leaving little opportunity for double-loop or deuterolearning, which may enhance operations and procedures leading to long-term organizational gains.

An expectation of boundary-less collaboration requires individuals to set aside fear, variances in performance abilities, and seek opportunities to fulfill higher-order

goals that position both Crown Inc. and Risk Corps. as a leader in their respective fields. Each company has taken steps to promote collaboration, including initiating team meetings each morning, biennial meetings of individuals who hold similar positions across the company in an effort to build rapport and trust, and software platforms that ensure individual and team-based learning can become organizational by making it accessible via technology. Boundary-less collaboration begins as a cultural expectation, and in this study, was revealed as a primary means of mitigating the inhibitors of learning which varied significantly based on participant experiences; this theme resulted as a resounding attempt to focus on the culture that places a high priority on organizational learning, rather than the many unique inhibitors of the learning process.

Discussion and Conclusions

This study provides the first empirical evidence to suggest that there may be a weak relationship between individual-level cognitive style and organizational learning capability. These relationships may be characteristically associated with the organizations and subgroups involved in this study, but not generalizable to all organizations or groups. As problem-solving style is theorized as independent of other levels of learning, this study supports the tenets of Kirton's (2011) Adaption-Innovation theory while refuting Hayes and Allinson's (1998) assertions that more innovative problem-solvers may catalyze organizational learning, namely double-loop learning, more effectively. Additionally, the qualitative data collected during this study resulted in five themes that inform the study and practice and problem solving and organizational learning:

1. Corporate expectations that create a clear, concise shared mental model for employee behavior and decision making provides a foundation for effective problem solving and change management.
2. The use of agreed-upon structures and methodologies for problem solving mediates the influence of experience and emotions, establishing a common process in pursuit of a resolution.
3. The development and nurturing of healthy teams prioritizes diversity and engage in interventions that ensure corporate expectations remain at the forefront of employee efforts.
4. A paradox of structure, resulting from resource limitations, inhibits learning.
5. An expectation of boundary-less collaboration mitigates inhibitors of learning.

In review, this study aimed to:

1. Describe the demographics of the two companies, their employees, and aspects of cognitive diversity within of each organization engaged in a change process.
2. Examine the relationship between cognitive style and organizational learning capacity.
3. Determine what role AC²s, more adaptive AC³s, and more innovative AC³s play in catalyzing organizational learning.
4. Identify inhibitors of organizational learning, distinguishing differences in inhibitors as experienced by AC²s, more adaptive AC³s, and more innovative AC³s.

In an effort to describe the demographics of the two Midwestern companies involved in this study, quantitative data was collected and analyzed. Crown Inc., a privately-owned materials manufacturing company, invited middle and upper-level managers to participate in this study ($N = 135$; $n = 116$). KAI scores indicated Crown Inc. operates in a slightly more innovative cognitive climate with a mean of 100.59 ($M = 95$) and a mean organizational learning capability score of 86.88. Crown Inc.'s strong company culture, as described by nine interview participants, provided framing for theme one: Corporate expectations that create a clear, concise shared mental model for employee behavior and decision making provide a foundation for effective problem solving and change management.

Risk Corps. ($N = 262$; $n = 138$), a privately held Fortune 500 company that provides financial and insurance products, has a slightly more adaptive cognitive climate than the general population with a mean of 90.89 ($M = 95$) and a mean organizational learning capability score of 77.42. Seven participants, most of whom described their role as customer-facing by way of phone communication, engaged in semi-structured interviews and shared that Risk Corps. corporate culture is under redevelopment due to a recent transition in leadership. As a result, participants described new approaches to collaboration and the physical work environment, but could not articulate shared values, mental models, and corporate expectations that were as clearly expressed by Crown Inc. interviewees.

This contrast highlights a limitation of the study in that positional leadership was not matched equally across both companies. Despite this fact, the prevailing theme

provides insight regarding the paramount importance of organizational culture in framing the context and expectations regarding problem-solving and learning.

Organizational leaders, managers, and consultants may find that defining expectations of organizational culture early in a change management process is helpful in developing supporting shared mental models and processes to inform effective problem solving and decision making. When an organization's culture emerges at the conclusion of an organizational change effort, rather than an intentional focus early in the change process that is revisited and refined throughout, that culture may be unable to support and inform other aspects of the change process, which may fail as a result. In short, a culture that puts culture first may serve organizations engaging in change management well.

Further researchers interested in these issues may wish to examine problem-solving style and the experience of individuals engaged in a change management process over time to understand more fully the influence of both culture and problem solving style in managing change. While this study did aim to explore the different ways in which more adaptive and more innovative problem solvers catalyze organizational learning, the results provided insight into the experiences of AC³s, primarily, but did not afford any conclusive findings concerning how more adaptive and more innovative individuals catalyze or inhibit organizational learning.

To examine the relationship between KAI scores and organizational learning capability, as well as subscales for each measure, a Pearson's correlation coefficient was calculated. Data from Crown Inc. participants resulted in a weak negative relationship between problem-solving style and organizational learning capability total scores, which suggests that individuals with a more adaptive problem-solving style may have a greater

capability to catalyze organizational learning. Data from Risk Corps. participants suggested no statistically significant relationship between problem-solving style and organizational learning capability. However, both data sets suggest that more adaptive and more innovative participants engaged the organizational learning capability subscale of Managerial Commitment to support organizational learning efforts, but they did so differently. The influence of organizational culture, including the importance of trust within Crown Inc. and the reliance on managers to lead problem-solving efforts in Risk Corps., provides additional context for these quantitative results.

Qualitative data related to Research Objective 2 resulted in two themes: 1) The use of agreed-upon structures and methodologies for problem solving mediates the influence of experience and emotions, establishing a common process in pursuit of a resolution; and, 2) The development and nurturing of healthy teams prioritizes diversity and engage in interventions that ensure corporate expectations guide employee efforts. While the data supported these themes as independent findings, these findings are interrelated: healthy, diverse teams develop and utilize agreed-upon structures and methodologies for problem solving; said structures and methodologies mitigate Problem B, which encourage and support healthy team dynamics. These findings are not novel, however the influence of culture (i.e. Theme 1) remains paramount in the execution of these behaviors within an organization.

An analysis of problem-solving structures and methodologies, including the experience of more adaptive and more innovative problem solvers would provide additional insights regarding the perception and use of various structures by individuals along Kirton's (2011) problem-solving style continuum. An understanding of these

perceptions and related experiences may inform the selection of a formal problem-solving process that best aligns with the cognitive climate, performance needs, and resource limitations of an organization.

Research Objective 3 aimed to determine what role AC²s, more adaptive AC³s, and more innovative AC³s play in catalyzing organizational learning. The quantitative data suggested there is no difference between these groups in their capability to catalyze organizational learning; this was supported in the qualitative data as well. While the experience of a uniquely-positioned, highly-innovative AC³ detailed herein supports Kirton's (2011) assertions regarding the challenges that AC³s may face, due to limitations of the study population, there was not sufficient data to suggest AC²s, more adaptive AC³s and more innovative AC³s engage in behaviors that catalyze organizational learning differently.

Lastly, this study provided an opportunity to examine possible inhibitors of organizational learning, with the intent to distinguish differences in inhibitors as experienced by AC²s, more adaptive AC³s, and more innovative AC³s. While different inhibitors were not found between AC²s, more adaptive AC³s, and more innovative AC³s, two themes emerged. Theme 4 suggests that a paradox of structure, resulting from resource limitations, inhibits learning. Participants in this study most often noted the limitations of time and money in solving problems, suggesting that these constraints may result in a short-term solution that becomes permanent. As a result, problems that might benefit from additional problem solving are considered resolved, limiting learning that might result from the problem-solving process, the resolution, and sharing the learning with colleagues broadly. Furthermore, a paradox of structure may inhibit the sharing of

information (transcending individual to organizational learning); problem-solving teams may be required to quickly move on to another problem without ensuring that learning extends beyond the team for the benefit of the organization. To this end, Theme 5 suggests that an expectation of boundary-less collaboration mitigates inhibitors of learning, such as fear, perceived lack of experience, and concerns regarding job security. This theme offers insight into the cultural dynamics, to include healthy, diverse teams, necessary to practice boundary-less collaboration.

In conclusion, this study suggests the importance of engaging cognitive diversity in productive, healthy ways to promote collaboration, problem solving, and learning. Learning is the result of a level construct, although each individual learns in his or her own style based on available motivation and resources (Kirton, 2011). While individuals can learn to cope, one's cognitive style will remain constant (Kirton, 2011). As such, a greater emphasis on coping strategies and learning as a result of coping may further the field's understanding of the relationship between these problem-solving styles and organizational learning capability.

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**The influence of individual-level cognitive style on organizational learning capacity:
Understanding the mediating social and environmental factors that promote
effective change management**

ABSTRACT

For decades, scholars have studied the role of cognitive style in catalyzing organizational learning, highlighting the paramount role of mediating social and environmental factors that promote effective change management. This study describes findings from a mixed method study of two Midwestern companies, underscoring the role of culture, agreed-upon structures and processes (both enabling and limiting), the cultivation of healthy teams, and boundary-less collaboration as factors that conduce to organizational learning. Furthermore, the author explored the leadership needed to manage such diversity and change management in an effort to maintain high-level organizational learning.

Introduction

Problem solving and learning have been widely studied, noting the importance of each process for individual, team, and organizational success. Examining the relationship between these processes, including the embedded nature of the individuals within teams, and furthermore, teams within organizations, as well as the environmental context in which learning and problem solving take place, provides insight into the factors that catalyze and inhibit organizational learning.

Kirton (2011) has defined the problem-solving process as successfully managing “ever-constant change” (p. 26) that is inherent due to the complexity of life and the dynamic environmental context individuals and organizations face today. Navigating change, or resolving a perceived novelty (Kirton, 2011), aims to position an individual or

team to address the next challenge, to include detecting the need for change and employing resources to respond accordingly. Described in this manner, learning is required to become more progressive at each stage of the process. As such, learning has been described as a highly desired outcome of the problem-solving process, and highlighted as the only “sustainable competitive advantage” (Hayes & Allinson, 1998, p. 847) in today’s aggressive marketplace.

While individuals and teams are engaged in problem solving daily, researchers have yet to delineate the variables that mediate the influence of individual problem-solving style and catalyze organizational learning. The intentionality of change, the role of change agents, and environmental tensions are central tenets of change management theories, and are paramount when considering change in the context of organizations. Cawsey, Deszca, and Ingols (2012) have described the climate and context in which organizations are operating today: “Sweeping demographic changes, technological advances, geopolitical shifts, and pressures to be sensitive to our physical environment are combining with concerns for security and organizational governance to generate significant pressure for organizational change” (p. 39). Kirton (2011) has described change as a constant state suggesting, “neither the philosopher nor the scientist supposes a state of ‘no change’” (p. 44).

For leaders and managers, acting as change agents embedded within organizational systems, Adaption-Innovation (A-I) theory provides a theoretical framework in which researchers are able to explore problem solving and learning. As Friedel (2014) has asserted, “The hallmark of A-I theory is the connection between an individual’s preferred style to solve problems and the management of change” (p. 65).

This notion, the application of A-I theory, and its assumptions have been explored as a parallel to organizational learning theory, calling out the similarities of these processes and the lasting impact of learning—single-, double-loop, and deuterio-learning (Arygris & Schön, 1996)—on organizational advancement. These parallels allow researchers to explore theorized relationship between cognitive style and organizational learning, as well as the unique experiences and environmental factors that influence individuals as they engage these processes to manage change.

Purpose and Objectives

This study sought to determine the relationship between individual-level cognitive style and organizational learning capacity, as well as the experience of individuals involved in problem-solving efforts at two Midwest companies. The following objectives guided this inquiry:

1. Describe the demographics of the two companies, their employees, and aspects of cognitive diversity within of each organization engaged in a change process.
2. Describe the limiting and enabling nature of shared mental models utilized by participants from each corporation.
3. Describe the mediating factors that enabled employees to focus on resolving a shared, agreed-upon problem (Problem A) and avoid distractions (Problem B).

Theoretical Frameworks

Organizations as Changing Enterprises

Cawsey et al. (2012) have operationalized organizational change as “planned alterations of organizational components [organizational mission, vision, strategy, goals,

structure, processes or systems, technology, and people] to improve the effectiveness of the organization” (p. 2). Articulated as intentional, planned, and relatively permanent (Cawsey et al., 2012), the study of organizational change necessitates a consideration of individual change agents, teams or work groups, as well as the context and climate of the organization.

Viewed as complex, open, social systems, organizations are composed of interdependent parts (Nadler, 1981). Katz and Kahn (1966) have described organizations as “open systems in that the input of energies and the conversion of output into further energetic input consists of transactions between the organization and its environment” noting an interdependence on external forces in enacting organizational change (p. 17). Systems theory also acknowledges the nested nature of systems within an organization, underscoring the interplay between systems, people, and the environment.

Organizations must constantly learn and adapt in order to diagnose and respond to opportunities and threats relative to their external environments, as well as to the complex internal climates (Arygris & Schön, 1996; Hannah & Lester, 2009; Heifetz, Grashow, & Linsky, 2009). In order to cultivate an environment that “encourages, facilitates, and sustains a favorable level of innovation and collective learning, leaders must influence systems and structures that contribute to organizational learning” (Yukl, 2009, p. 50). As Marsick (2000) has attested, “Systems learning cannot occur unless the system as a whole is adequately prepared to absorb and use the learning so that it becomes shared, easily accessed, and productively employed in the service of the systems’ agreed upon vision” (p. 10). Systems, both human and technical, must be aligned, focused, and sufficiently

motivated to problem solve and learn; a challenge that poses numerous obstacles and grants unique opportunities for organizations that aim to thrive.

Adaption-Innovation Theory

Kirton's (1976) (A-I) theory provides a unique lens through which to investigate the roles of problem solvers, the problem-solving team, and the environmental context of the problem, as well as problem-solving processes as organizations face the challenge of navigating uncertainty and change. A-I theory acknowledges the complexity of organizations as systems, acknowledging the importance of feedback that is exchanged between problem solvers, their environment, and their introspective selves. A-I theory was developed as a result of Kirton's (2011) Management Initiative, a study of companies and their experiences related to solving problems and creating change within their department or organization. As a result of this research, Kirton (2011) articulated a six-step problem-solving process: 1) Perception of the problem; 2) Analysis of the problem; 3) Analysis of the solution; 4) Agreement for change; and, 5) Implementation (Kirton, 2011, p. 10). This process was significant in the formation of A-I theory, as Kirton (2011) acknowledged the environmental influences on the change process noting, "As individuals, so with cultures (which are the reflections of their members' shared structures): Different environments offer varying opportunities at differently perceived cost, to be managed, then exploited" (p. 7). Kirton's (2011) research provides a schematic for advancing organizational initiatives that also incorporates cognitive systems and functions with a focus on an individual's problem-solving style.

A-I theory posits that individuals have different problem solving styles (Kirton, 1976); that is, the stable, preferred way in which a person conceives of a problem, and

proceeds to a resolution varies as individuals exercise a more adaptive or a more innovative problem-solving style. Problem solving, regarded as a process, is comprised of various elements, including “level (capacity measured on a unipolar scale), motive, and perceived opportunity, [while] style more broadly encompasses the context of leaders and managers, and the management of change” (Kirton, 2011, p. 2). As style and level are orthogonally related, so are style and intelligence and capacity (the number of problems and/or how complex one is able to engage at any given time). Additionally, style is independent of skill, motivation, and perceived opportunity are unrelated to one’s preferred problem solving style entirely. Core to the understanding of A-I theory, Kirton (2011) claims a) When we problem solve we are limited by the way we are built (e.g., our intelligence; no one has endless capacity or flexibility)... (b) All of us are intelligent and creative, at different levels and with different styles, and, therefore, all of us are capable of problem solving, as long as there is both motive and opportunity. (p. 3)

Thus, Kirton (2011) developed a continuum along which cognitive style is described as more adaptive or more innovative, relative to the cognitive style of other problem solvers in the environment. Figure 1 provides context for A-I’s theoretical continuum, including the general population mean (95), noting that 68% of the population will have scores within one standard deviation of the mean and 95% of the population will be placed on the continuum within two standard deviations of the population mean (Kirton, 2009).

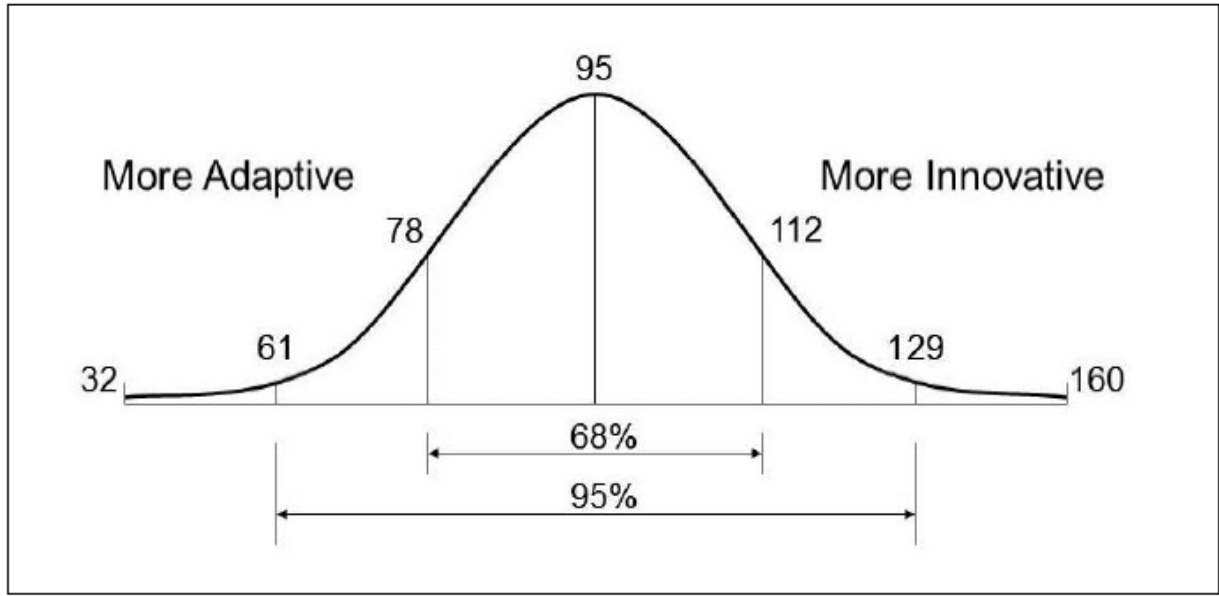


Figure 1. Theoretical distribution of KAI scores along the continuum from more adaptive (left) to more innovative (right) for the general population. From The value of adaption and innovation as a function of diversity (p. 69), by C. Friedel, In N. Erbe (Ed.) *Approaches to managing organizational diversity and innovation*, Hershey, PA: IGI Global. Copyright 2014 by IGI Global.

Adaption versus Innovation. Using the terms “more adaptive” and “more innovative,” Kirton (2011) has described problem solvers’ use of structure in the problem-solving process, noting that more adaptive problem solvers strive to make situations “better” by engaging pre-existing structure and rules, while more innovative problem solvers often alter current structures and rules in an effort to generate solutions that are perceived as “different.”

The diversity of problem-solving preferences, ‘fit’ between the nature of the problem and a problem-solver’s preferred cognitive style, and the environment—both internal and external—to dynamic, highly-competitive organizations requires skilled leadership to manage change effectively. That is, problems and organizations, by the nature of their cognitive climate and structures, are often defined as more adaptive or more innovative. As such, individuals with a more adaptive cognitive style often feel

most comfortable and best suited to solve adaptive problems (i.e. highly structured, careful attention to details, opportunities to implement known solutions or do things “better,” etc.), and conversely, more innovative problem solvers often prefer a more innovative problem (i.e. less structured, opportunities to think globally and do things “differently,” etc.) and problem-solving environment. This diversity is advantageous as differing approaches and perspectives are perceived as beneficial during the problem formulation and strategy development phases of the problem-solving process. However, the management of this cognitive diversity presents unique challenges for organizations and individual problem solvers as they strive to process information, generate knowledge, and engage in organizational learning to innovate, adapt, and remain competitive in their industry and sector.

The Paradox of Structure. The target for problem-solving leaders is to “manage structure, by adjustment and readjustment, so as to set just sufficient limits that will achieve maximum enabling” (Kirton, 2011, p. 287). This assertion outlines Kirton’s (2011) notion of the paradox of structure, in which he suggests that all structures, including but not limited to, cognitive diversity, internal and external environments, organizational culture, policies and procedures, resources (i.e. time, money, etc.), and the nature of the problem, among others, enable and limit problem solvers to resolve perceived novelty. Kirton (2011) has further clarified that problem-solving leadership has a responsibility to engage structures to accomplish “maximum enabling,” or stated differently, to utilize structures to support problem solvers as they work to address the problem(s) at hand (p. 287). These structures are engaged by more adaptive and more innovative problem solvers in different ways. For example, those who prefer to approach

problems from a more adaptive perspective use rules, policies, and procedures as a guide to address concerns. Alternatively, those who are more innovative often choose to adapt the rules as a part of their preferred approach to solving a problem. The extent to which an individual accepts or rejects shifting or breaking boundaries in the problem-solving process is essential to managing an effective problem solving team, as the nature of the problem and other environmental structures will further enable or limit a team's efforts. Kirton (2011) notes that while adaptors prefer structure, constraints that are too tight to allow the engagement of novelty (change is ever-constant) and conversely, the elimination of all structure prevent focused thinking (structure is ever-present) pose challenges during the problem-solving process. Agreement on the type and use of structure, due to the inherent limitations and opportunities introduced by the paradox, is essential to effective problem solving efforts, whereas a lack of agreement necessitates additional, often unrecognized coping from members of the team, further limiting the resources available to resolve an issue under consideration.

Problem A and Problem B. Although a necessary consideration for effective problem-solving teams, cognitive diversity often results in discord as more adaptive and more innovative individuals learn to cope with the complexity of problem solving with others in an effort to accomplish a shared goal. Individuals engaged in problem solving are faced with two problems: Problem A, or the shared problem that the team has been formed to address, or has identified; and, Problem B, “any problem that impedes progress towards [a] resolution to Problem A” (Kirton, 2013, p. 12). Problem B may be the result of varying forms of diversity (e.g. culture, gender, ethnicity, power, social economic status), as well as differences in problem-solving style. Regardless of the nature of a

Problem B, it diverts resources from efforts to resolve Problem A. As Kirton (2011) has asserted:

Adaptors are thought notorious by the more innovative for insisting on the resolution of Problem B before they are comfortable in solving the main task. If this does not happen readily, they are liable to exert more and more pressure for conformity in an increasingly wide area of operations. Equally notoriously for the more adaptive, innovators are liable to threaten to fracture the team with personally held diverse perceptions of the problem and searches for solutions. They also seem to risk abandoning the team in the hope of finding an unlikely solution around which they might then try to re-energise the team – however much its members may doubt its potential for success. (Kirton, 2011, p. 205)

Thus, problem-solving leaders must effectively diagnose the climate, evaluate and engage the structure (perceived and used differently by more adaptive and more innovative problem solvers), and ensure a shared commitment—an agreement to collaborate—to advancing the organization’s mission as the central problem of focus (Problem A). As such, Friedel (2014) has suggested that problem-solving leadership may be defined as the leveraging of cognitive diversity to solve problems, recognizing the paramount role that cognitive diversity plays in collaborative problem solving efforts.

Agents of Change. Kirton (2011) has described all problem solvers, ergo all people, as “agents of change” (AC¹; p. 230). In a social context, while each individual remains an AC¹, they are also either an AC² or an AC³ based on their KAI score in relationship to the group or team with which they are engaged in problem solving. AC²s

comprise the consensus group, usually about 40% of the group assuming a normal distribution of KAI scores, and include KAI scores within 10 points on either side of the group mean (Kirton, 2011). In defining the consensus group in this way, AC³s are necessarily denoted with KAI scores that fall outside of this range and include the most adaptive and most innovative problem solvers on the team (Kirton, 2011). While an AC¹ may be an AC², or a member of the consensus group, in one social context, the same individual may be an AC³ in another group based on the group mean for KAI.

As power often lies with the consensus group, AC²s may report feeling heard, understood, and included in the process; overall, more comfortable engaging in problem solving due to similar perceptions of the problem and use of problem-solving structures amongst members of this group. Conversely, more adaptive AC³s and more innovative AC³s will perceive these structures and, more broadly, the problem, differently. Hanks et al. (n.d.) provide empirical evidence to support Kirton's (2011) assertion that AC³s are naturally less comfortable, as their varied (more adaptive and more innovative) problem solving frames are often not accepted by the consensus group. This positionality is both advantageous as AC³s often see and come to know problems from different perspectives, as well as negative, as their specialization and unique viewpoints are often misunderstood or dismissed altogether (Kirton, 2011). As a result, AC³s must determine their individual motivation for navigating this cognitive diversity, and develop coping strategies that allow them to remain engaged over time.

Coping Behavior. While the systems and processes inherent to organizations are both enabling and limiting, motivation to cope, or a learned technique or behavior that is outside of one's preferred cognitive style that aims to increase comfort during problem-

solving activities, within these structures and to collaborate varies due to the organization's culture, expectations, and available resources (Kirton, 2011). As Kirton (2011) has observed:

Mastering the art of successful collaboration involves having shared structures that bear direction on the common problem, including the language for communication... Collaboration is effective when it involves enough common ground to allow it to happen and enough diversity to match the diversity of the common problem. (p. 206)

Furthermore, the structure of problem-solving teams and practice of solving problems collaboratively builds a scaffold for engagement that results in trust, an enhanced leadership capacity among team members, and engaged social networks that resource the organization (Stone, Crosby, & Bryson, 2014). The tensions associated with collaboration are often a byproduct of individual differences, and reflect the ways in which change agents utilize structures and systems in an effort to resolve Problem A with minimal coping for the shortest period of time (Kirton, 2011). As such, A-I theory (Kirton, 2011) provides leaders with an understanding of the dynamic nature of collaboration, taking into account the multifaceted nature of individuals, structures, and motivation to ensure effective problem solving and change management in a rapidly changing world.

The problem-solving process requires agreement to collaborate, not only concerning the identification of the problem to be resolved, but also in terms of the structures engaged and coping tolerances. Agreement promotes a focus on Problem A, the problem to be resolved, and limits distractions, Problem B. This theoretical lens

positioned researchers to explore the relationship and influence of problem-solving style on learning at an organizational level, as both effective problem solving and organizational learning position organizations to succeed in a highly-competitive global economy.

Organizational Learning

Research on organizational learning has increased in recent years, diverging methodologically as well as theoretically, as scholars from various disciplines debate whether learning should be studied as a cognitive or behavioral process (Argote, 2011; Dodgson, 1993). During this time, the environment in which organizations find themselves has also evolved, necessitating a change in the consumption and intentional engagement in processes that contribute to knowledge creation and organizational learning, as many organizations strive to remain relevant and competitive in their respective markets (Nonaka, 1994). Organizational learning is defined as a process by which “members of the organization act as learning agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory in use, and embedding the results of their inquiry in private images and shared maps of organization” (Argyris & Schön, 1978, p. 23). This definition emphasizes the process of inquiry, knowledge creation, and learning, which offers a distinct parallel to the problem-solving process and the opportunity to investigate the influence of an individual’s preferred problem-solving style on the process of organizational learning.

It is essential to note that organizational learning is not simply the cumulative result of members’ learning, but a process that requires information and new knowledge

to become embedded in the behaviors, culture, mental maps, and values of an organization over time (Hedberg, 1981). Furthermore, this process results in various typologies of learning and associated actions at the organizational level (Hedberg, 1981). Argyris and Schön (1996) describe organizational learning as having three distinct components: “[a] informational content; [b] a *learning product*; [c] a *learning process* which consists in acquiring, processing, and storing information; and [d] a *learner* to whom the learning process is attributed” (p. 3). Each component plays an essential role in the development of human and technical infrastructures that catalyze and sustain systematic and useful learning at an organizational level.

Organizational Learning Typologies. Through the process of error detection and correction, learners’ aim to preserve current goals by making adjustments to theories-in-use that aim to correct inefficiencies, errors, or to engage in minor improvements with the intent of maintaining stated organizational objectives by engaging in single-loop learning (Argyris & Schön, 1996). This instrumental learning may result in the revision or replacement of shared mental models through which individual learning becomes socialized and embedded in organizational efforts, however single-loop learning avoids challenges to the core pillars of the organization—it’s values, assumptions, beliefs, and purpose (Argyris & Schön, 1996).

Double-loop learning, also referred to as meta-level learning (Hedberg, 1981), necessitates changes in norms, values, beliefs, and worldviews as a means of correcting errors. This process not only results in changes to theories-in-use, policies, procedures, and organizational activities, this rare form of learning engages learners in a process of

generative thinking that illuminates new ways of defining an organization's mission, vision, and culture (Argyris & Schön, 1996; Hedberg, 1981; Hussain & Yazdani, 2013).

Lastly, inquiry through which an organizational enhances its capacity for learning or all types (i.e. single- and double-loop) has been referred to as deutero-learning; a complex, highly-reflective process that requires an intentional focus and dedicated leadership to achieve (Argyris & Schön, 1996; Hedberg, 1981). This learning typology necessitates that members learn about previous contexts for learning, as well as episodes during which the organization failed to learn, as they consider how and why they must change with a deeper understanding of the variables and strategies that facilitated and inhibited prior learning (Hedberg, 1981). This process results in the development of cognitive strategies aimed at facilitating adaption or innovation, and novel theories-in-use that will serve as a foundation for action toward a revised purpose.

The establishment of shared mental models and knowledge structures that contribute to knowledge creation and organizational learning are influenced by cognitive style, as these models are developed and challenged based on an individual's preferences for solving problems (Hayes & Allinson, 1998). Noting that individual mental models are malleable, adapting in response to changing beliefs, social, political, and informational shifts, these changes have implications for shared mental models and the efficiency and effectiveness of collective learning. As Kim (1993) has explained:

Organizational learning is dependent on individuals improving their mental models; making those models explicit is crucial to developing new shared mental models. This process allows organizational learning to be independent of any specific individual... The intangible and often invisible assets of an organization

reside in individual mental models that collectively contribute to the shared mental models. The shared mental models are what make the rest of the organizational memory usable. Without these mental models, which include all the subtle interconnections that have been developed among the various members, an organization will be incapacitated in both learning and action.” (p. 44)

Threats to the development and maintenance of shared mental models, and as a result organizational learning, may be examined in light of cognitive style, whereas cognitive diversity is viewed as a contributor to, and inhibitor of, organizational learning (Hayes & Allinson, 1998; Kirton, 2011). As Argyris (1977) has asserted, “society presently presents individuals with theories-in-action that generally are counterproductive to individual growth and organizational effectiveness” (p. 29). Thus, leadership is needed to encourage reflective practices that identify inconsistencies between espoused theories of action, theories-in-action, and ineffective theories-in-action (Argyris & Schön, 1996).

Leading Efforts to Catalyze Organizational Learning. Taking into consideration the complexity of organizational learning theory (Argyris & Schön, 1996), a single leadership attribute, skill or theory has not been identified to advance organizational learning. Transformational leadership (Bass, 1991; Bass, 1999) has been offered by many scholars as an applicable theory (García-Morales, Jiménez-Barrionuevo, Gutiérrez-Gutiérrez, 2010; Hannah & Lester, 2009; Jaskyte, 2004; Zagoršek, Dimovski, & Škerlavaj, 2009), as it articulates a process by which leaders motivate individuals to do something more, better, or differently than it has been done before. Yukl (2009), however, asserts that the theory’s emphasis on a single leader’s influence and the dyadic

nature of the leader-follower relationship does not adequately address the shared influence and organizational culture that is necessary for collective learning.

With its core tenets rooted in transformational leadership (Bass, Avolio, Jung, & Berson, 2003), adaptive leadership, or the “practice of mobilizing people to tackle tough challenges and thrive” by developing new ways of performing in challenging environments (Heifetz et al., 2009, p. 14) has emerged as a contending leadership theory for consideration. Adaptive challenges, similar to the aforementioned tensions experienced by nonprofit leaders, are without resolution and require learning and collaboration; the distinction of technical and adaptive challenges is the first charge of adaptive leaders (Heifetz et al., 2009). Adaptive leadership further distinguishes leadership from authority (power and control, sans empowerment), and requires an environment that:

- builds on the past by encouraging people to distinguish what should be preserved, and what is expendable;
- encourages adaptation through experimentation and embraces disequilibrium;
- relies on a culture that represents diverse values and perspectives;
- acknowledges that new adaptations “significantly displace, reregulate, and rearrange” organizational systems; and
- requires time to accomplish adaptation, as described within the context of this theory. (Heifetz et al., 2009, p. 14-16)

Thus, adaptive leaders serve as social architects, collectively managing change at the individual, group, and organizational level in an effort to orchestrate learning, reflection, and the use of new organizational maps and heuristics to construct a learning

environment conducive to organizational learning, as conceived by Argyris and Schön (1996).

Applied to the management of structuring forces articulated herein, trust, shared power, and accountability are prerequisites for organizational learning. Leveraging these forces to engage in problem solving and organizational learning more effectively ensures the competitive advantage associated with learning and adaptation are realized as benefit for leaders and managers. Acknowledging and effectively managing the tensions that persist within highly-competitive markets necessarily exercises the reflexive capacity of problem-solving leaders, setting the stage for productive learning to ensue.

Organizational learning must be intentionally encouraged, beginning with “strategies and structures that foster a culture of inquiry... [whereas] strategy is an intermediary filter between the environment and the organization” (Dodgson, 1993, p. 387). Scholars suggest that effective organizational learning requires the following conditions and capacities:

- *Committed, adaptive leaders*: leadership that is committed to eliminating the need for mental models that perpetuate assumptions, replacing them with revised models that align with a new organizational culture (Heifetz et al., 2009; Jerez-Gómez, Céspedes-Lorente, & Valle-Cabrera, 2005);
- *Systems perspective*: a “collective conscious” that allows the organization to be seen as a system, utilizing a common language, routines, and processes that contribute to the collective advancement of shared visions and goals (Jerez-Gómez et al., 2005, p. 17);

- *Culture of openness and experimentation*: a commitment to cultural and functional diversity that displaces defensiveness, embraces creativity, and is tolerant of controlled risk taking and enhances learning efficacy (Jerez-Gómez et al., 2005; Hannah & Lester; Yukl, 2009);
- *Knowledge transfer and integration*: as learning is socially constructed, learning organizations must simultaneously integrate and internally transfer knowledge and tools, such as a common language for governing, between their members through discussion and collaboration that transcends workgroups, committees, and seniority cultivating a decentralized work environment (Jerez-Gómez et al., 2005; Perkins et al., 2005);
- *Diversity*: developing and engaging diverse members in learning provides the organization with access and enhanced social network and rich resources that may be used in the reconstruction of mental models (Yukl, 2009; Marsick, 2000);
- *Comfort with ambiguity and change*: organizational learning is a complex process that necessitates ongoing inquiry and challenges individuals to reframe learning. As a result, learning to transition from single-loop to double-loop learning requires a level of comfort with unlearning, unknowing, and the reconstruction of shared mental maps; a nonlinear change process steeped in ambiguity and tension. Lastly, Perkins et al. (2007) has asserted that the rate of change, either incremental or radical, must be considered as a structuring force when engaging in organizational learning; analyzing the rate

of change needed to simultaneously accomplish organizational objectives and learning requires ongoing monitoring and evaluation.

Furthermore, Jerez-Gómez et al., (2005) have asserted that trust between actors serves as the foundation for the aforementioned learning conditions suggesting, “the relationship between trust and dimensions of the organizational learning capability construct is complex and may be reciprocal, with growth and changes in one supporting and reinforcing the other” (Jerez-Gómez et al., 2005, p. 719). Additionally, trust can be conceived as a necessary prerequisite for the establishment of shared values and norms, which serve as indicators of active “organizational rather than individual learning” (Dodgson, 1993, p. 382).

Organizational learning provides a means by which individual learning contributes to the models, processes, values, and structures that inform and guide an organization’s efforts. Although complex, organizational learning is an essential function of the advancement of organizational efforts and necessitates an interconnected human and technical systems rooted in trust, shared values, and an institutional culture that values learning as a product of its collective work.

Methods

The target population for this research effort consisted of employees ($N = 397$) from two Midwestern companies engaged in organizational change efforts and utilized a sequential explanatory mixed methods design (Creswell & Plano Clark, 2011). Participants completed a 16-item demographic survey, followed by a 16-item organizational learning capability instrument (Jerez-Gómez, Céspedes-Lorente, & Valle-Cabrera, 2005); KAI scores were provided, with consent from participants, by a third-

party consulting firm in the form of data-on-hand. During the qualitative phase of the study, 16 employees participated in semi-structured interviews.

Quantitative Data Collection

KAI. Kirton's Adaption-Innovation Inventory (KAI) is a psychometric tool which measures cognitive style, also referred to as problem-solving style (Kirton, 2013). The KAI contains 32 assessment items and results in a total score scale ranging from 32-160 (Kirton, 2009). Administered online by a third-party consulting firm and provided to the researcher in the form of data-on-hand, participants are asked to score each item on a continuum from "very hard" to "very easy." KAI has an internal reliability coefficient range between .84 to .89, indicating good reliability among items in this scale (Kirton, 2013).

KAI contains three summed construct scores, or sub scores, which provide additional insight into individuals' preferred problem-solving style. These subscales include: Sufficiency of Originality (SO), describing idea generation; Efficiency (E), describing problem solving methodology; and Rule/Group Conformity (R), describing the management of social structures (Kirton, 2013).

Organizational Learning Capability. The organizational learning capability instrument includes 16 items with response options on a Likert scale from one to seven, with one representing "strongly disagree" and seven representing "strongly agree" (Jerez-Gómez et al., 2005). The assessment includes four summed dimensions:

- (1) Managerial Commitment: Recognition of the importance of learning by managers and leaders, and the development of a culture that promotes the acquisition, creation, and transfer of knowledge as paramount, both in terms

of strategy and as a fundamental value;

- (2) Systems Perspective: Developing a shared identity through mental models, language, and an emphasis on relationships that contribute to the achievement of shared organizational goals;
- (3) Openness and Experimentation: A commitment to diversity and exploring novel ideas, with an emphasis on individual knowledge being renewed and expanded, as well as tolerance for controlled risk-taking and learning from one's mistakes; and,
- (4) Knowledge Transfer and Integration: Simultaneous transfer and integration of information between individuals and throughout an organization through social engagement, systems, and processes (Jerez-Gómez et al., 2005).

The organizational learning capability instrument has an internal reliability coefficient range between .72 and .82, and a Cronbach's alpha of .88 for the whole scale, indicating good reliability among questions in this scale (Jerez-Gómez et al., 2005). The measure was administered via an online survey provided to participants by email.

Descriptive statistics were used to describe participant KAI scores and group individuals as AC²s (10 points or less from the group's average KAI score), and AC³s (more than 10 points from the group's average KAI score). A bivariate (Pearson) correlation was used to determine whether a relationship between KAI score and organizational learning capability existed at a significance of .05

Qualitative Data Collection

Aiming to better understand the experience of participants with high organizational learning capability scores, the mean of the scores was calculated and

participants with high scores within one standard deviation from the mean were included in the population ($N = 53$). Nine participants from Crown Inc. and seven from Risk Corps. consented to participate; this sample included AC²s ($n = 4$) and more adaptive AC³s ($n = 5$) and more innovative AC³s ($n = 7$). An interview protocol (Appendix C) was developed using *a priori* propositions (Appendix D); interviews were conducted via phone and recorded, ranging from 22 to 64 minutes in length. Recorded interviews were transcribed by an independent transcriber and pseudonyms for each company were chosen at random to ensure the confidentiality of the organizations; participants were identified by a participant number for purposes of confidentiality. Transcribed interviews were coded in ATLAS.ti using the constant comparative method of analysis, and further cut and sorted to identify categories and themes (Corbin & Strauss, 2008).

Results

Objective 1: Participant Demographics for Quantitative Data

In partnership with a strategic consulting firm, two Midwestern companies engaged in product development and sales for more than 180 years, collectively, were selected to participate in the study. Both companies voluntarily engaged a third-party consulting firm to provide collaborative, methodical strategies for business performance improvement.

Crown Inc. Crown Inc., a privately-owned materials manufacturing company with facilities in 19 communities, spanning five states, described itself as being highly motivated as its leaders and employees seek to continually improve their products and processes in order to exceed customer expectations. With a focus on high-quality product delivery, Crown Inc. emphasizes the importance of a strong, consistent organizational

culture, corporate leadership, and systematic processes that support its standing as an industry leader.

In response to a call from employees to clarify how they were expected to approach their work in order to meet the high standards set by corporate executives, a set of core values and guidelines for executing day-to-day tasks was developed approximately 15 years ago. The development and systematic sharing of these resources established a new company culture with an emphasis on the people and processes that lead to exceptional products. The ongoing engagement of a third-party strategic consulting firm supports Crown Inc.'s various process improvement efforts, maintaining its status as a highly-regarded employer and successful materials supplier.

KAI scores for Crown Inc. ($N = 135$; $n = 116$) ranged from 54 to 147 on the continuum with a mean of 100.59 and a standard deviation of 19.18, indicating a slightly more innovative cognitive climate in comparison to the general population mean ($M = 95$). Organizational learning capability scores ranged from 41 to 111 with a mean of 86.88 and standard deviation of 12.82. Interestingly, corporate leadership was described as being much more innovative, whereas employees engaged in day-to-day manufacturing efforts were perceived to be more adaptive, regardless of their KAI score or position along the continuum; I was able to confirm this perception in consultation with a representative of the third-party consulting firm.

Table 1 provides a breakdown of gender diversity; 111 participants identified as male, four identified as female, and one participant did not respond. The median age of participants was 43.43 years ($SD = 10.00$) (Table 2). Crown Inc. employees self-reported educational attainment (Figure 2), indicating 66 participants have earned a bachelor's

degree and 35 have attained an advanced degree. Figure 3 includes frequencies of participants' tenure with Crown Inc., with the highest frequencies reported indicates 31 participants have been employed with Crown Inc. for three to five years, followed by 29 participants who reported being employed by Crown Inc. for six to 10 years. Additionally, 16 participants reported employment with Crown Inc. for 16 years, 15 participants reported employment ranging from 11 to 15 years, 12 participants reported employment ranging from 16 to 20 years, eight participants reported employment ranging from one to two years, and three participants reported employment ranging from 20 to 25 years; one participant reported employment for less than one year and one participant did not respond. Participants represented a wide range of positions and levels of responsibility from various facilities across the five-state service area.

Table 1

Frequencies of Crown Inc. gender (n = 116)

Measure/Item	<i>f</i>	<i>%</i>
Male	111	95.7
Female	4	3.4
Non-responders	1	0.9

Table 2

Descriptive statistics for Crown Inc. employees' demographics (n = 116)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	43.43	10.00	116

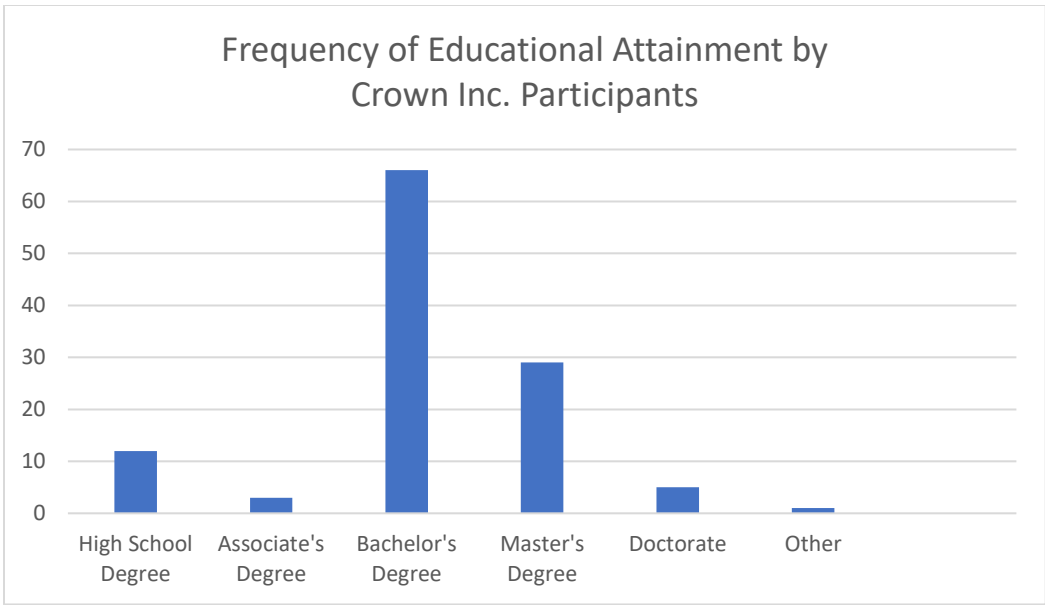


Figure 2, Frequency of educational attainment by Crown Inc. participants.

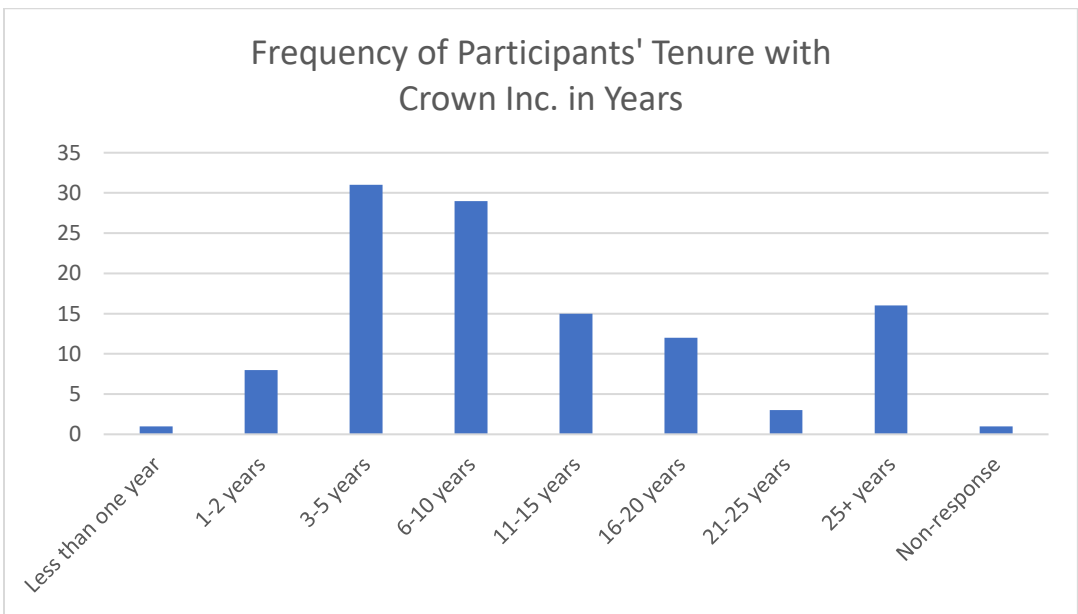


Figure 3, Frequency distribution of participants' tenure with Crown Inc. in years.

Risk Corps. Risk Corps. is a privately held Fortune 500 company that provides various financial and insurance services for individuals and corporations in the United

States. Ranking as one of the top five companies in its field, Risk Corps. purports a commitment to unwavering company values and a history of strong, stable performance across the company's many services.

A transition of a top executive in 2015 served as the catalyst for a change in company culture, to include an emphasis on putting the customer first in all they do. To augment and assist in managing this change process, Risk Corps. engaged a third-party strategic consulting firm to support various departments and teams within the organization.

KAI scores for Risk Corps. ($N = 262$; $n = 138$) ranged from 52 to 140 on the continuum with a mean of 90.89 and a standard deviation of 15.38, indicating a slightly more adaptive cognitive climate in comparison to the general population ($M = 95$). Organizational learning capability scores ranged from 22 to 110 with a mean of 77.42 and standard deviation of 15.25.

Table 3 provides a breakdown of gender diversity; 100 participants identified as female, 36 identified as male, and two did not respond. The median age of Risk Corps. participants was 39.25 years ($SD = 13.06$) (Table 4). Risk Corps. employees self-reported educational attainment (Figure 4), indicating 77 participants who have earned a high school degree, while 36 have completed a bachelor's degree or higher; 13 participants indicated they completed some other advanced educational program. Figure 5 includes frequencies of participants' tenure with Risk Corps.; the highest frequency reported indicates 32 participants have been employed by Risk Corps. for 25 or more years, while 26 participants reported employment ranging from three to five years, and another 26 participants reported employment with Risk Corps. for less than one year.

Additionally, 25 participants reported employment with Risk Corps. for six to 10 years, 19 participants reported employment ranging from one to two years, and five participants reported employment ranging from 11 to 15 years and 16 to 20 years; no participants reported employment with Risk Corps. ranging from 20 to 25 years.

Table 3

Frequencies of Risk Corps. gender (n = 138)

Measure/Item	<i>f</i>	%
Male	36	26.1
Female	100	72.5
Non-responders	2	1.4

Table 4

Descriptive statistics for Risk Corps. employees' demographics (n = 138)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	39.25	13.06	130

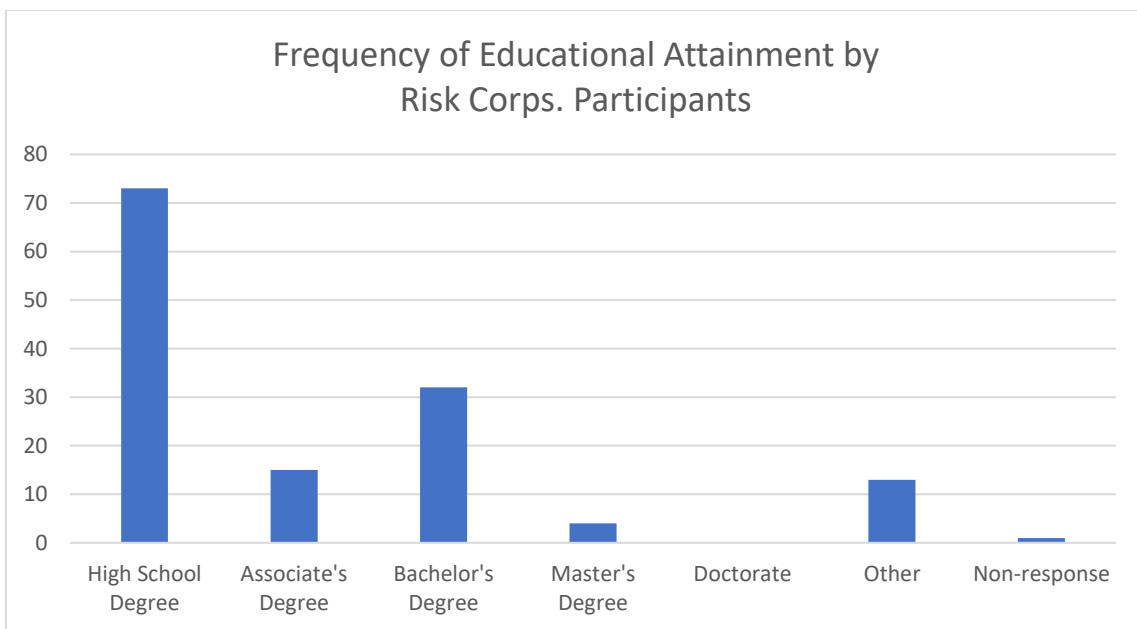


Figure 4, Frequency of educational attainment by Risk Corps. participants.



Figure 5, Frequency distribution of participants' tenure with Risk Corps. in years.

Objective 1: Participant Demographics (Qualitative Data)

Participants were selected for this portion of the study based on the quantitative data collected in the previous strand; demographic data that provides context for the qualitative findings is provided below.

Crown Inc. Nine Crown Inc. employees participated in semi-structured interviews ($N = 22$; $n = 9$); Table 5 provides an overview of gender frequencies with most participants reporting to be male. The average age of participants was reported to be 43.44 years ($SD = 11.10$) (Table 6). KAI scores ranged from 81 to 130 with a mean of 102.77 ($SD = 18.62$). Based on the mean KAI score of the organization ($M = 100.59$), this sample consisted of two AC²s, three more innovative AC³s, and four more adaptive AC³s. Organizational learning capability scores ranged from 90 to 98 with a mean of

93.44 ($SD = 3.21$). Seven participants reported a bachelor’s degree as their highest level of educational attainment; one participant reported having completed a master’s degree and one reported completing high school. Their tenure with Crown Inc. ranged from three to five years up to 25+ years with the organization.

Table 5

Frequencies of Crown Inc. gender (n = 9)

Measure/Item	<i>f</i>	<i>%</i>
Male	8	88.8
Female	1	11.1

Table 6

Descriptive statistics for Crown Inc. employees’ demographics (n = 9)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	43.44	11.10	9

Participants were able to quickly and easily articulate the company’s values, describing the company culture and their individual experiences using very similar terms, examples, and descriptive language. Collectively, Crown Inc.’s employees identified Crown Inc. as a family, repeatedly stating, “We’re all in this together.” This sentiment serves as the anchor for other unique cultural aspects of Crown Inc.’s dynamic, systematic work environment.

Risk Corps. Seven Risk Corps. employees participated in semi-structured interviews ($N = 31$; $n = 7$); Table 7 provides an overview of gender frequencies with most participants reporting to be male. The average age of participants was reported to be 36.57 years ($SD = 15.83$) (Table 8). KAI scores ranged from 76 to 140 with a mean of 101.57 ($SD = 21.57$). Based on the mean KAI score of the organization ($M = 90.89$), this

sample consisted of one more adaptive AC³, two AC²s, and four more innovative AC³s. Organizational learning capability scores ranged from 85 to 98 with a mean of 90.00 (*SD* = 4.43). Three participants reported a bachelor’s degree was their highest level of educational attainment, two participants reported having received a high school degree, one participant obtained an associate’s degree, and one participant reported “Other.” Their tenure with Risk Corps. ranged from less than a year up to 25+ years with the organization.

Table 7

Frequencies of Risk Corps. gender (n = 7)

Measure/Item	<i>f</i>	<i>%</i>
Male	1	14.3
Female	6	86.7

Table 8

Descriptive statistics for Risk Corps. employees’ demographics (n = 7)

Measure/Item	<i>M</i>	<i>SD</i>	<i>n</i>
Age	36.57	15.83	7

Culturally, Risk Corps. was praised as a good employer, however, their culture was less well defined and employees struggled to articulate shared values, norms, and goals aside from their emphasis on a “customer first” focus and daily performance quotas. When compared to the decades-long effort underway at Crown Inc., change management at Risk Corps. is in its infancy. As such, corporate expectations and cultural guideposts are under development and not yet established as shared mental models.

Objective 2 & 3: Mediating Factors

While an analysis of the quantitative data resulted in only a weak relationship between organizational learning capability and cognitive style on several instrument subscales, the qualitative data suggested there are several mediating social and environmental factors, represented by five themes (Table 9), which support change management and exploit the benefits of cognitive diversity. Specifically, these mediating factors reduce the impact and prevalence of Problem B, which in turn, allow for resources to be dedicated to resolving Problem A. Additionally, the data indicates that mediating cultural factors may promote deutero-learning, a higher-level learning that sustains learning at an organizational level due to a deeper understanding of how the organization, and thereby its members, learn. Learning at this level challenges learning practices, and requires ongoing reflection and the modification of learning frameworks, to include the assessment and management of knowledge that is important to the organization, technical, and human infrastructures (Cross & Israelit, 2000).

Table 9

Alignment of Research Objectives, Interview Questions, and Qualitative Data Themes

Research Objective	Related Interview Questions	Qualitative Themes
RO1: Describe the demographics of the two companies, their employees, and aspects of cognitive diversity within of each organization engaged in a change process.	How would you describe the work environment and the organizational culture at [Company Name] and more specifically, within your department or facility?	T1: Corporate expectations that create a clear, concise shared mental model for employee behavior and decision making provides foundation for effective problem solving and change management.
RO2: Describe the limiting and enabling nature of shared mental models utilized by	Tell me about any group norms or rules, written or unwritten, that are in place both organizationally for	T2: The use of agreed-upon structures and methodologies for problem solving mediates the

participants from each company.	[Company Name], as well as within your facility.	influence of experience, emotions, and establishes a known path forward.
	How are rules and group norms developed, and by whom? Have they been adapted or changed, during your tenure or otherwise?	T3: The employment of former military officers aims to introduce skilled problem-solvers and effective communicators to the organization.
	Does your team have a set of agreed upon values that guide your work together?	
	Do you perceive you and your team have a common system for utilizing symbols or shortcuts that help you to understand and evaluate problems in the workplace?	
	Have you experienced a time when you and your team questioned or modified existing policies, norms, and procedures in order to solve a problem?	
RO3: Describe the mediating factors that enable employees to focus on resolving a shared, agreed-upon problem (Problem A) and avoid distractions (Problem B).	Does your team have a formal or informal problem-solving process?	T4: The development and nurturing of healthy teams prioritizes diversity and interventions that ensure corporate expectations remain foundational.
	Describe a time when you or someone else may have learned something but didn't share that learning with the team or with others in the company.	T5: An expectation of boundary-less collaboration mitigates inhibitors of learning.

Many scholars have offered descriptors of a culture that promotes organizational learning (Argote, 2011; Argyris & Schön, 1996; Dodgson, 1993; Fiol & Lyles, 1985;

Kim 1993), however the culture of Crown Inc. specifically, provided an excellent environment for researchers to explore a *culture that puts culture first*. By prioritizing a strong, unwavering commitment to advancing and enhancing their company culture, employees have clear boundaries, performance-based expectations, and support that enables them to deliver high-quality products and maintain exceptional morale.

This research effort identified five themes which could mediate cultural components that delimit the complexities that are unique to environments that embrace cognitive diversity: 1) corporate expectations that create a clear, concise shared mental model for employee behavior and decision making (produced and promoted via an organizational guidebook); 2) the use of agreed-upon structures and methodologies for solving problems; 3) the employment of former military officers; 4) the development and nurturing of healthy teams; and, 5) an expectation of boundary-less collaboration. Independently, each of these factors are powerful in framing an organizational culture that conduces to organizational learning; together, these influences created an environment that propelled the organization toward growth and mission attainment because of the impact of the culture on employees' ability to collaboratively problem solve and learn at an organizational level.

Corporate Expectations. Not unlike many other successful organizations, especially those that have a high capacity for learning, organizational values and group norms, namely trust, accountability, and autonomy are ever-present; in this case, these three values, identified by Crown Inc. employees, are paramount and create a trifecta in which the balance of each is essential for learning and the management of cognitive diversity. The importance of corporate values and associated expectations have been

detailed in a guidebook serves as a shared mental model, explicating organizational values and a schematic for making efficient, definitive decisions in a fast-paced manufacturing environment. Although the importance and utility of Crown Inc.'s corporate expectations in terms of collaborative problem solving was repeated by many participants, it was articulated best by Participant 1. When asked by a colleague how to proceed in solving a problem, Participant 1 stated, "My answer to them is simply this, 'Safety, quality, productivity.' It's like, 'Ok, I know what I need to do now.' And so, that's one of the mental check sheets that we have." Safety, quality, and productivity are three of Crown Inc.'s core values which serve as a mental model for how to proceed in resolving a problem, prioritizing tasks, or allocating resources in response to emerging needs.

The guidebook provides the foundational expectations for all employees within the organization. It can be recited and referenced from memory by all participants interviewed from Crown Inc., and has been augmented in practice by other resources, such as *The Five Dysfunctions of a Team* (Lencioni, 2002), which is provided to all employees upon hire. Lencioni (2002) underscored the importance of trust within teams and defined the importance and value of conflict in resolving problems. However, Crown Inc.'s culture has further defined the boundaries for conflict within the organization's established culture, noting that conflict over ideas is encouraged, sans emotions. For Crown Inc., this principle serves as a pillar that guides its formal and informal problem solving processes.

The importance of the guidebook cannot be overstated. Nearly a decade ago, managers requested a resource that would promote more consistency and clarity in terms

of organizational expectations. While the culture was shifting under new leadership, Crown Inc.'s managers lacked a consistent interpretation and plan for implementation of organizational expectations within their facilities; this served as an opportunity and invitation for buy-in that enabled corporate leaders to succeed in developing the guidebook. After many years of living out its core principles, the guidebook has reportedly changed very little, if at all, and continues to empower and excite employees who are interested in being part of an organization that offers such a rich culture and clarity of identity, purpose, and expectation.

The guidebook may be most significant in its ability to catalyze and inhibit organizational learning. Because Crown Inc.'s culture is so clearly defined and embedded within the fabric of the organization, company values, beliefs, and core focus are rarely challenged. Because of this, double-loop learning may be inhibited; conversely, deuterio- or triple-loop learning appears to be promoted due to the nature of the structures and processes employed at Crown Inc. This focus on higher-order meta learning provides a competitive advantage as the learning process is continually refined as internal and external environmental factors shift within the industry, and more broadly, the global marketplace. Lastly, it is imperative to note that due to this paradox of structure, problems may arise within the environment that lie outside of Crown Inc.'s current paradigm and therefore undetectable. This risk necessitates careful monitoring of the culture, as well as internal and external environments.

While Risk Corps. has taken steps to enhance its corporate structure, Participant 9 shared that little in the way of corporate expectations have been documented to date:

I know the company has a general you know...your employee handbook and that type of thing and as far as the team concept is concerned, you work together as a team to accomplish things and so there really isn't anything documented.

Noting the substantial difference in the time Crown Inc. and Risk Corps. have been working toward change efforts—a difference of more than 20 years, measured by the most recent transition in CEO leadership—Risk Corps. has taken steps to clarify and articulate their cultural position, however additional time and effort must be invested to accomplish the deeply-rooted expectations, norms, and values that guide the daily behavior and problem-solving efforts of Crown Inc. employees. Additionally, it is notable to reference the differences in the nature of each organization's business; the data presented herein must be contextualized with an understanding of the differences in their respective fields—manufacturing (Crown Inc.) and financial and insurance services (Risk Corps.).

In comparison to the clear articulation of corporate expectations and an emphasis on maintaining the integrity of Crown Inc.'s culture, Participant 13 described Risk Corps.' values in their own words:

Risk Corps. broadly has agreed upon values that we work by and then what we do in our meeting daily, we go over a value and what that means to us, so right now as a team we're focusing on customer focus. But for Risk Corps. broadly, there's a focus on integrity, customer focus, productivity... there's actually a whole list but I can't read it from here. There's like six or so values that we, Risk Corps., broadly focuses on but right now our team is just focusing on customer focus.

Furthermore, Participant 10 provides insight into the physical environment:

Oh, gosh, there's been a lot of changes! Management is a lot different. I mean we used to have like regular business like you know suits and stuff for the culture, and then we kind of went to business casual and now we're even allowed within this last year, we can wear jeans!... I was shocked you know after 38 years or so you know you think, oh my gosh I never thought I would see that.

As reflected in the above quotations, Risk Corps. is pursuing a “customer-focused” orientation and thereby defining their shared Problem A as meeting or exceeding customers’ needs, rather than on an internal culture that encourages behaviors, systems, and policies that aim to deliver on customer expectations. This approach requires a great deal of resource to meet the ever-changing needs and demands of customers, and positions Risk Corps. primary shared goal external to the culture and operation of the organization. As a result, the strength of the company culture (i.e. shared values, norms, and goals) may shift over time in response to various internal and external factors, namely the evolving needs of their diverse customer base, individually and collectively. While this may be beneficial in some instances, the approach may also result in a culture that lacks clarity and focus as a result of pursuing customer interests rather than sound internal business practices. Furthermore, Risk Corps. participants underscored environmental and procedural changes that may be aimed at mitigating Problem B, rather than naming or addressing the shared problem they have come together to resolve. This data suggests that Risk Corps. may benefit from establishing or reimagining its cultural core, before implementing environmental and procedural changes that must rely on the culture for sustained, effective execution.

Agreed-upon Structures and Methodologies for Solving Problems. The paradox of structure, as described here, is both enabling and limiting (Kirton, 2011). However, a structure for problem solving should effectively catalyze learning and enable a focus on Problem A. Deciding on a general framework and process each time a problem emerges depletes resources, as this distraction from solving the problem at hand can be qualified as a Problem B. Although no single process may fit the complex challenges facing organizations, clarity regarding agreed-upon tools and resources enables employees to engage in effective problem-solving efforts more rapidly and efficiently. Crown Inc. has employed Six Sigma and the DMAIC (Define-Measure-Analyze-Improve-Control) method as a problem-structuring methodology, breaking the problem-solving process in to sub-tasks (de Mast & Lokkerbol, 2012). Because a defined problem-solving process is in place, Crown Inc. employees must necessarily engage the enabling (for the more adaptive) and limiting (for the more innovative) nature of a defined process. In the case of Six Sigma and the DMAIC method, specifically, the brainstorming process and use of statistical data offers a balance and counter-balance that satisfies, broadly, adaptors and innovators alike (de Mast & Lokkerbol, 2012). This paradox of structure is essential to note. However, the need for coping due to the impact of cognitive diversity during problem-solving exercises is further mitigated by the strategic development of teams that employ—even exploit—task-domain specific knowledge and are able to adapt the process as the problem-solving environment shifts and the structure of the problem evolves (see more on team development and composition below).

From a management strategy that requires a shift in culture (Sanders & Hilb, 2000) to a “high-performance, data-driven approach to analyzing the root causes of business problems and solving them” (Blakeslee, 1999, p. 78), Six Sigma has been used to accomplish a multitude of organizational objectives. Schroeder, Linderman, Liedtke, and Choo (2007) have suggested Six Sigma is “an organized, parallel-meso structure to reduce variation in organizational processes by using improvement specialists, a structured method, and performance metrics with the aim of achieving strategic objectives” (p. 540). This definition provides clarity regarding the probable influence of Six Sigma on organizational learning – single-loop, double-loop, and deuterio-learning – as it emphasizes the importance of involving specialists as guides, an agreed-upon structure for solving problems (eliminating this variable as a possible Problem B), and defined outcomes that are expected to improve performance, and in the case of Crown Inc., the financial benefits are tangible to employee-owners.

As a parallel-meso structure, Six Sigma functions outside of the day-to-day operations of the manufacturing environment, providing time, resources, and expertise to address high-priority improvements and innovations, which may be described as “better” or “different.” In terms of encouraging organizational learning, the DMAIC method affords Crown Inc., the opportunity to navigate Problem B, in this case the paradox of limited time and resources, that often interfere with effective problem solving efforts. This is supported by the establishment of a champion to oversee and lead a process to resolve an agreed-upon problem with defined end results, while interfering minimally in the day-to-day work of the facility.

The language, processes, charts, graphs, and statistical procedures that comprise the DMAIC method, and other aspects of Six Sigma methodologies, have become shared mental models for Crown Inc. employees. These problem-solving resources are known and used by employees at all levels and functions within Crown Inc.; employees know what steps to take, what resources are available, and how to talk about the tasks at hand in ways that expedite problem solving and reduce distractions. In terms of learning, this research suggests that the reflection and after-action reporting, as well as the documentation that is essential to the effectiveness of the DMAIC method enhances Crown Inc.'s capability to engage in organizational learning, specifically deutero-learning.

Lastly, the use of Six Sigma and the DMAIC method is a data-driven process; the collection and use of data to make informed decisions necessarily reduced the opportunity for emotional decision making. As conflict is encouraged around ideas—not people or feelings—so is decision making focused on data, further reducing conflict and affirming a culture in which emotions have limited, if any, influence in the problem-solving process, thereby reducing the focus on Problem B and resourcing employees to resolve Problem A.

Risk Corps. participants remarked that their organization does not have an agreed-upon problem-solving process or structure. In fact, problem-solving efforts are often deferred to supervisors, as Participant 13 described:

I reach out to a specialist and then if they can't help me I go to a supervisor...

Cause all of our specialists and supervisors have worked here for a bunch of

different years so we all kind of trust them and trust each other to come up with good, good solutions to a problem.

Similar statements were offered by other Risk Corps. participants. When extrapolated to the learning process, this approach may limit opportunities for discernment, asking how and why questions, and deepening one's understanding of the circumstances and the imagination to resolve future problems independently. Furthermore, the absence of a structure for individual or team-based problem solving necessitates an error-detection-and-correction process that may decrease the likelihood of engaging in double-loop or deuterio learning; the responsibility for learning and resolving novelty falls to a supervisor only.

This point also highlights a limitation of the study in that many Risk Corps. participants were primarily front-line, customer-facing employees, as opposed to mid-level and executive/corporate managers and leaders, such as those at Crown Inc. Even so, the lack agreed-upon structures limits employee engagement in problem-solving efforts, and thereby, the benefit of cognitive diversity, and individual learning that may become organizational.

Employment of Former Military Officers. During the interview process, I discovered that many of Crown Inc.'s Six Sigma Black Belts, an advanced certification level within Six Sigma's training program, were former military officers. Furthermore, as Black Belts are an entry level position within Crown Inc.'s management program, these individuals have been promoted up and across the many facilities operated by Crown Inc., taking with them a comprehensive knowledge of Six Sigma principles and a shared language for problem solving that has penetrated all aspects of Crown Inc.'s

efforts. When asked why Crown Inc. has employed such a significant number of former military officers, Participant 15 noted:

When we look at Black Belts, there's really three things that we're looking for... We're looking for a certain level of technical aptitude... they do need to be able to understand engineering concepts and statistical concepts and you know high math and science type... We're also looking for leadership and what I would call relational ability.... The Black Belts... are tasked with... solving a problem that no one's been able to solve, with a team that doesn't directly report to, nor has any real obligation to report to you... so you have to be able to use a lot of influence... [and] different leadership techniques. And then the third is the ability to communicate... So, we ask our Black Belts to report on their project, to do what we call a report out which is a priority that they brief every two months... and that goes directly to the CEO of the company, and the executive team, all the general managers, and then a lot of the directors and primary staff... So, with that you would imagine you really have to have that ability to communicate... You need to be comfortable briefing, comfortable talking with folks, but also the ability to brief technical concepts in a nontechnical manner so that everybody understands it. So, when you look at the totality of those requirements, what we have found over the last 14 years or so that the Six Sigma department's been around is that that combination tends to fall within the military officer realm... we've just been most successful finding those attributes, if you will, within that division.

In an effort to explore brainstorming and the socialization of ideas in the problem formulation and resolution stages of the problem-solving process, expecting more adaptive and more innovative problem solvers to approach this differently (Kirton, 2011), participants employed at Crown Inc. revealed a preference for observing a chain of command rather than seeking socialization opportunities with similar or more diverse cognitive styles. This behavior may be the result of specialized training and extensive practice as a result of their former military experience, but may also offer a formal structure for maximizing diversity of thought. In an effort to minimize coping, one may prefer to avoid socializing ideas with a problem-solver with a similar style (i.e. scores within 10 points on the KAI continuum). By visiting with a supervisor regarding novel ideas and insights, Crown Inc. employees are not seeking confirming or contradictory perspectives from colleagues with problem-solving styles similar or more adaptive/innovative than their preferred style, respectively; an added value that exploits the benefits of cognitive diversity.

Additionally, A-I theory suggests that high cognitive resource or high manifest level (i.e. intelligence) may also reduce the effort needed to cope due to an expanded skill set and opportunities to refine coping strategies, assuming motivation to cope is present (Kirton, 2011). At Crown Inc., employees spend little if any resource considering who to consult with novel ideas. It is imperative to note that this finding is specific to brainstorming and idea generation, not an error-detection and correction process. This differentiation is significant, as participants are not seeking a resolution to a problem, but sharing new or novel ideas that may add value to the manufacturing environment.

This theme is unique to the data collected from Crown Inc. employees and was not reflected by Risk Corps. participants. However, the influence of former military officers at Crown Inc. warranted explanation as it aids in contextualizing the relationship between culture, problem-solving, and learning.

Developing and Nurturing Healthy Teams. Crown Inc. has prioritized building small, diverse teams, while simultaneously implementing resources that allow teams within the company to advance innovation and quality in product development. While the development of diverse teams, namely in terms of cognitive and skill diversity, as well as tenure within the company (aimed to advance institutional knowledge), has been a focus of corporate leaders at Crown Inc. for many years, an emphasis has more recently been placed on team size.

Small teams have been noted by participants as being free of the structures and complexities that limit problem solving; the more informal the rules are, the more flexible the team can be in solving problems that may have other fixed boundaries or structures (note, these may be more enabling or more limiting as the cognitive climate of the team and the nature of the problem evolve). By developing and maintaining small teams, Crown Inc. has established a relatively flat organizational structure, extending more resources, including access to corporate leadership, to individuals across the organization. In terms of organizational learning, the socialization of ideas needed for information to become important and incorporated within the policies, procedures, and reflective practices embedded within Six Sigma and DMAIC methodologies becomes much easier due to increased levels of trust, and more efficient as the diversity of the team is readily engaged to advance or rethink novel suggestions. Additionally, small teams lead to a

sense of empowerment, as power is delegated by positional leaders and thoughtfully allocated to local teams within Crown Inc.'s manufacturing facilities. Not surprisingly, empowerment has promoted confidence and timeliness in problem solving, enhanced collaboration, and learning due to lack of restrictions and limitations placed on larger teams in more traditional environments.

Furthermore, small teams necessitate that new members be a good fit and that they learn quickly. Crown Inc. is extremely selective in its hiring practices; one participant noted that 100% of individuals involved in the hiring process must agree to a new hire. Participant 15 explained, "We interviewed over 400 people last year and hired... 10. So, you know we hire at about a 2% rate of the people that we interview even within a fairly selective pool." Careful hiring decisions have led to a stable, reliable, and tenured workforce. Participant 1 noted, "Our workforce has been, is very stable. We had one person retire last year and before that, we hadn't had anyone really leave for a while, and we haven't hired another person at this plant in about 10 years so I say that to say our workforce is stable and as a result, we know each other." The nature of Crown Inc.'s hiring and onboarding process is augmented by a culture that emphasizes personal relationships – on the job and off the clock.

Small teams may aid in healthy conflict, which was noted by Crown Inc. employees as being essential to their collaboration and problem solving efforts. Conflict concerning ideas and free of emotion was stated consistently as a marker of a healthy team. By employing agreed-upon structures for solving problems, Crown Inc. has removed many of the emotional barriers that prevent ideas and solutions from being freely explored. Their reliance on data rather than a feeling guides problem-solving

efforts; as a result, conflict over ideas prevails as a means of learning and advancing organizational initiatives. Participant 2 remarks, “So we’re a very small team and so our processes I think are a little bit looser than some of the other facilities. But typically, [Company Name] is obviously a very data driven company. So, usually if we have a conflict, it’s a conflict around the data.” This reflection clarifies the importance of flexibility within the defined structure, the value of small teams, and conflict that focuses on the data.

Participant 4 supported these assertions,

So, there is always going to be, when you bring people from different backgrounds or different processes within the facility, everybody is going to have a different idea in terms of what they think is a solution to the problem. And so, by having the conflict between team members, you generate a lot more brainstorming ideas and you generate a lot more conversation. But [at Company Name] we actually do a lot with Lencioni [2002] in terms of *The Five Dysfunctions of a Team* and looking at really how a team interacts and we encourage this type of conflict between team members. If everybody goes into the meeting, I say, ‘Hey, I want to try A, B, and C,’ and everybody’s, ‘That sounds good, do it.’... Why do I need to have a team? Why do I need their input if they’re just going to agree with everything I say or everything I do? And so, by having conflict, you actually get honest feedback... And you know, you may see it as conflict, someone disagreeing, but at the same time they’re bringing alternative thoughts and ideas to the table which actually contribute to the overall project.

This constructive outlook on the utility and engagement of conflict brings additional clarity to the culture and expectations of problem solving within Crown Inc.

Crown Inc. employees noted that when data and systems fail, relationships carry the team through to success. Rooted in respect and trust, strong relationships that are enhanced by working in small, collaborative teams provide the cohesion needed to navigate challenging, time-sensitive problems in the workplace. One participant indicated that the values at Crown Inc. were intended to make the work personal; others described working at Crown Inc. like working with family. Participant 1 described a common sentiment at Crown Inc. stating, “We’re all in this together” or the sense that Crown Inc. employees were part of a family. The personal nature of this approach and the intentionality of leaders and manager to model the importance of relationship building across teams and departments has further supported collaboration and learning.

Crown Inc. has supported a deeper understanding of individuals and their preferences by using a personality indicator. All employees complete the assessment, which results in being assigned a personality descriptor, and participated in a training session that aims to inform and make sense of their results, and the ways in which aspects of their personality relate to other indicators. Personality descriptors are indicated on employee hardhats for quick reference, and employees reported the use of this information as an embedded group norm; Participant 4 explains:

That’s one of those unwritten rules... we have four [personality descriptors]. And a [personality descriptor] comes across as more data specific: here’s what we want do, here’s how we want do it. A [personality descriptor] ... takes a little more time to think through the process and understand the process. And so when

we go to these meetings, and we're trying to get this data or get this information, you may have a [personality descriptor] in your meeting, and you may not want put him on the spot and it's kind of this unwritten rule you know, hey don't put that guy in the spot and don't expect him to contribute immediately, but by the time you get back to your office, these guys typically have a well thought out, well versed email with everything that they were thinking. It's just their personality and that's one of those unwritten rules that helps [with change management] ... You know, develop different ways to communicate with people. So, one of the unwritten rules is really understanding the [personality descriptors] of the people that are on your team, and part of the team that we develop has a mixture of these [personality descriptors] because they each bring different ideas and concepts to the table which is what we're looking for. We're not looking for a unilateral approach to a problem. We're looking for a variety of solutions and then use data and analytics to determine which is the best solution.

Similar explanations were conveyed by other Crown Inc. employees; the broad implementation and use of a personality inventory identifying descriptors as a tool for understanding and communicating has alleviated many of the Problem B related to problem-solving within cognitively-diverse teams. Unlike KAI, however, the personality descriptor used by Crown Inc. does not take into account the relational positionality to the problem at hand, or others engaged in the problem-solving effort, to be engaged. This heuristic or mental model may be simplified in order to accommodate broad goals related to communication and respect of diversity in terms of traits defined within the personality descriptors included, however may lack the specificity of other tools.

Lastly, when solving problems, participants consistently posed the question, “Is this good for the team?” In this way, they positioned the team to be more important and more capable than the individuals that comprise it. Participant 15 stated, “And you realize why you don’t want to do that... it doesn’t make the team better.” This sentiment was repeated by employees of Crown Inc. as a way of being; teams serve as the central and most important unit within the organization because of their collective ability, resource, and experience. This priority elevates the importance of small, healthy teams that serve as the foundation for collaboration across their multi-state, multi-facility organization.

Risk Corps. has taken steps to develop and nurture healthy teams, namely in providing additional opportunities for engagement during morning meetings or “huddles.” Risk Corps. uses morning meetings as a leadership opportunity, inviting all members to lead or contribute to meetings in various ways; overall, morning meetings were seen as a very positive, beneficial, and empowering aspect of their company culture. Risk Corps. has a dedicated team of employees who communicated an eagerness to learn and do more. As additional structures and shared mental models are put in place, Risk Corps. is positioned to remain an industry leader.

Boundary-less Collaboration. Collaboration at Crown Inc. is expected, and while that expectation aligns with their values and clearly defined company culture, the term “boundary-less collaboration” was used by participants to highlight the priority placed on collaboration throughout the company. While technological systems are in place to capture technical corrections and more detailed learning from the manufacturing floor, those resources are only valuable if trusted and used routinely. As personal

relationships serve as a foundation for trust and collaboration at Crown Inc., various meetings, gatherings, trainings, and events ensure the expectation regarding collaboration is clear and resources are available—from personal relationships to technical systems for accessing data—to utilize past learning for current and future gain.

Prior to the culture shift described herein, Crown Inc. employees reported that collaboration was not always expected or desired, and in some cases, was avoided altogether due to employees feeling threatened or inadequate. In the past, knowledge ensured job security and gave select employees or facilities a perceived advantage. Crown Inc.'s current culture calls for termination in the event employees knowingly withhold or silo information that would advance the goals of the company. This standard has placed a priority on the team's success over a single employee, and simultaneously eliminated an inhibitor of learning.

To facilitate this level of boundary-less collaboration, Crown Inc. has developed biennial meetings that convene employees from across the company in similar roles. By meeting and developing personal relationships, Crown Inc. has increased the likelihood of collaboration among employees at its facilities, and often the prompt resolution of product defects, decreased machinery maintenance time, and more diverse teams addressing intractable problems. Additionally, teams throughout Crown Inc. facilities meet each morning to review concerns from previous shifts and plans for the day ahead. These meetings provide a forum for the exchange of information, as well as a time to note concerns or ideas with managers present. Morning meetings were repeatedly described as a time for collaboration and problem-solving that benefitted all parties as they prepared for the day. This resource, both time and the direct expense of these brief

meetings, has resulted in a more positive work environment in which concerns and ideas are expressed freely, addressed directly, and successes are celebrated regularly.

Risk Corps. participants discussed collaboration differently, expressing the desire to share keyboard shortcuts for entering data or strategies for meeting daily quotas more efficiently, but broadly did not describe collaboration around problem-solving outside of morning meetings; this is a distinction between technical and adaptive problems being addressed at Risk Corps. versus Crown Inc. Similar in structure and function to those convened by Crown Inc., morning meetings serve as a time to raise concerns, celebrate successes, and share new ideas for the team to consider. Risk Corps. uses morning meetings as a leadership opportunity, inviting all members to lead or contribute to meetings in various ways; overall, morning meetings were seen as a very positive, beneficial, and empowering aspect of their company culture. Risk Corps. has a dedicated team of employees who communicated an eagerness to learn and do more. As additional structures and shared mental models are put in place, Risk Corps. is positioned to remain an industry leader and exceed customer expectations.

The collection of interviews conducted with Risk Corps. employees suggests that collaboration among more senior leadership is expected, with individuals responsible for business divisions retaining decision-making authority, however execution of collaborative behavior may be stifled by group norms that value efficiency and decisiveness; norms that, in this environment do not afford employees the time and resources needed to establish the details of collaborative engagements across teams and departments. Thus, a conflict between espoused theories and theories-in-use may prevent

collaboration from being an effective (i.e. time, resource, outcome) expectation in resolving problems in order to maintain a focus on Problem A.

Discussion and Conclusions

Cognitive style plays an important role in individual learning and the development of mental models, however a call from researchers to explore this relationship further had not yet been met (Chiva & Habib, 2015; Hayes & Allinson, 1998). This sequential explanatory mixed methods study suggests that there is a weak, if not negligible, relationship between individual problem-solving style and organizational learning capability. A deeper understanding of the experiences of individuals engaged in collaborative problem solving efforts offer insights into mediating social and environmental factors that enable an organization to exploit efforts to resolve Problem A (and diminish the impact of Problem B). Although cognitive style influences individual-level mental models and the perception and interpretation of information during any learning process, strong heuristics, in the form of shared mental models that have been conceived and implemented by corporate leadership, do appear to mediate the individual-level construct problem-solving style. It is worthy to note that Hayes & Allinson (1998) offer caution against “extreme simplifiers” or heuristics that circumvent the need for problem solving and learning, noting that learning may be blocked as organizational members are not able to effectively perceive environmental shifts and integrate new learning into current shared mental models (p. 859). To this end, Covey (1992) attests:

The more aware we are of our basic paradigms, maps or assumptions, and the extent to which we have been influenced by our experience, the more we can take responsibility for those paradigms, examine them, test them against reality, listen

to others and be open to their perceptions, thereby getting a larger picture and a far more objective view. (p. 29)

The enabling and limiting nature of these models, and more broadly the environment are critical to understand. This is illuminated in the paradox of structure that enables Crown Inc. to thrive today, but may limit their ability to perceive problems that arise outside of their current paradigm. Organizational leaders must continually examine, discuss, and revise shared mental models in an effort to remain relevant, competitive, and efficient; this practice necessitates developing and nurturing *a culture that puts culture first*.

Chiva and Habib (2015) describe this as a mindfulness versus mindlessness regarding culture; a high consciousness regarding the importance and priority of nurturing a culture that allows employees to exceed corporate and customer expectations. These findings are supported by Fiol and Lyles (1985) review of organizational learning as the authors suggest that culture is both contextual, creating the conditions for learning to occur, as well as learning content; that is, individuals must learn and adopt the shared mental models, values, beliefs, and norms that provide the parameters for learning, decision making, and problem solving to occur.

While the data presented here suggests systems and shared mental models are critical cultural components, agreement on a system must be predicated on an agreement to collaborate. This serves as the foundation for agreement on systems, problem-solving methodologies, and the management of diversity, cognitive style notwithstanding. The results of this study highlight the system or resources (i.e. Six Sigma or the employment of former military officers) that were highly effective for Crown Inc. I recommend the development and implementation of the best systems and resources to meet industry-

specific goals, noting the importance of understanding the varying structure, or lack thereof, present in problems at hand. These processes may also be viable options within and across other fields, however a focus on reflecting and understanding *how* and *why* they contribute to success is essential for systems development that conduce to organizational learning. Scholars caution that without reflection and interrogation, these systems, and a strong organizational culture, may reduce innovation as employees no longer seek novel ways of solving known problems (de Mast & Lokkerbol, 2012; Kim 1993) and may inhibit organizational learning altogether (Vince & Saleem, 2004); Fiol and Lyles (1985) suggest a “flexible, decentralized, and organic organizational” structure may further mitigate potential negative influences (p. 805). Balance, reflexivity, and an aforementioned agreement to collaborate may provide some guard against this outcome.

Collectively, many of the mediating factors presented herein are complementary to those outlined by Wenger (1998) in defining a community of practice as a conceptual framework for “thinking about learning as a process of social participation” (p. i). As a social learning theory, Wenger (1998) suggests we “adopt a different perspective, one that placed learning in the context of our lived experiences of participation in the world” (p. 3) as a means of constructing an identity that is shaped and changed by individual and collective learning; Swieringa and Wierdsma (1992) assert that this is essential in developing learning organizations as well. In light of these research findings, communities of practice, as a learning theory, warrants further discussion within the context of industrial and manufacturing sectors, as these mediating factors—1) corporate expectations that create a clear, concise shared mental model for employee behavior and decision making (produced and promoted via an organizational guidebook); 2) the use of

agreed-upon structures and methodologies for solving problems; 3) the employment of highly-successful former military officers; 4) the development and nurturing of healthy teams; and, 5) an expectation of boundary-less collaboration—may offer additional insights into the culture and structures that catalyze learning.

Although this study aimed to explore differences between more adaptive and more innovative problem solvers in their ability to catalyze organizational learning, the data did not support any findings to this end. Although more research is needed, the data presented may support a case for individuals with a high organizational learning capability coping via the integration and use of shared mental models. By engaging shared mental models and organizational systems, their preference for problem solving more adaptively or more innovative may be less well known due to their ability to cope effectively.

Further research should explore the differences of more adaptive and more innovative AC³s with low scores of organizational learning to see if there is a difference in perceptions of the shared mental model. One may be able to assume that these individuals have “checked out” of the process and see the most issues with the shared mental model, or are choosing not to cope.

In conclusion, this study explicated the social and environmental factors that mediate the often-perceived negative influence of cognitive diversity (and resulting Problem B), underscoring the importance of an agreement to collaborate and the use of established structures and systems to do so effectively. Additional research is needed to better understand the long-term impact of these factors as external environmental factors evolve and industry demands shift. Furthermore, a focus on corporate leadership may

lend insights into the development and implementation of these, and other, mediating factors; such learning is key for practitioners to replicate these environmental elements for advancement in various fields. As these research opportunities are explored in more detail, leaders and managers should consider the value of cognitive diversity more deeply as they assemble problem solving teams. This will necessitate further review of how adaptors and innovators view and exploit shared mental models. Further research is needed to understand if the mediating factors discussed here are found in other high-performance change environments, and how leaders engage these cultural and environmental factors in an effort to meet performance, production, and service delivery goals.

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CONCLUSION

The following meta-inferences have been drawn from the quantitative and qualitative data collected in this study, as well as related literature to situate these findings within the context of organizational behavior. The novelty of this study lies in the examination of a relationship between individual problem-solving style and organizational learning capability. The findings, although some may say lack novelty, report on the data collected in response to the established objectives.

Discussion and Conclusions

Problem-solving style and learning are independent of one another

This research effort suggests that problem-solving style and learning are independent, indicating an individual's preferred way of resolving a problem has no relationship with their organizational learning capabilities. Although this finding is contrary to Hayes and Allinson's (1998) suggestion that more adaptive problem solvers may promote double-loop learning, and conversely, more innovative problem solvers may catalyze double-loop learning, the results support Kirton's (2011) A-I theory and assertions of the independence of problem-solving style.

The weak and moderate correlations reported were better understood by the qualitative data and a more thorough explanation of the problem-solving and learning environment. Cultural expectations provide clarity in regards to the weak negative relationship between more adaptive problem solvers and organizational learning capability of Crown Inc.'s participants. Similarly, a greater understanding of the weak positive relationship between KAI subscale Efficiency and subscales Managerial Commitment and Systems Perspective, which indicated that more adaptive individuals

were associated with a more managerial commitment and systems perspective, is understood in the context of Risk Corps. organizational culture and an externally-focused Problem A (i.e. a “customer-first” approach that was recalled as paramount in all efforts).

As such, more adaptive and more innovative problem solvers can be assumed to equally conduce organizational learning (single-, double-loop, and deuterio-learning), when the organization’s culture, structures, policies, and procedures prioritize and support learning at an organizational level and motivation to learn is present. Motivation and opportunity are needed to exercise intelligence and creativity in problem solving (Kirton, 2011), however motivation was not examined directly in this study.

Internal vs. external locus of motivation

A review of qualitative data suggests that the locus of motivation for Crown Inc. participants may be internal to the organization—the individuals that comprise the Crown Inc. “family.” Crown Inc. participants all articulated the notion that employees are a family, and as they make decisions, consideration for the team comes first and foremost: “Is this good for the team?” Participant 15 further clarified, “And you realize why you don’t want to do that... it doesn’t make the team better.” Conversely, the locus of motivation for Risk Corps. employees may be external to the organization; their customer-first position aims to ensure employees are focused on the customers’ needs. If motivation to serve the customer exceeds motivation to collaborate and learn together—necessary conditions in order to exercise intelligence and creativity in problem solving—Risk Corps. may not be positioned to capitalize on efforts to resolve related Problem B.

A culture that puts culture first is able to create the necessary conditions to support policies, procedures, and structures that enable problem solving and learning at an organizational level

Kotter (1996) offers a change management model that suggests “Anchoring New Approaches in Culture” as a final step in the change process, however this research effort indicates the need for culture to be firmly established such that policies, procedures, and learning, at an organizational level, can be rooted in the integrated systems of the organization. *A culture that puts culture first* must be sustained; it must be the central focus of efforts at all levels within the organization in order to maintain and refine a culture that enables success. The integration of policies, procedures, and structures creates a system in an organization with a strong culture, enabling the organization to manage change efficiently, adapt to shifting markets quickly, and respond to internal and external threats and opportunities as needed (Fiol & Lyles, 1985).

Agreement to collaborate is predicated on a norm that gives permission to ask questions and challenge existing frameworks for problem solving and learning

In order for single-loop learning—simple error detection and correction—to advance and become double-loop or deuterio-learning, not only does the culture need to sustain the systems, policies and procedures that conduce these more complex forms of learning, but there must be a norm that provides individuals with permission to ask questions and challenge existing systems, structures, and group norms. Permission to engage in a deeper set of questions, reframe problems and possible solutions, and engage in effective problem solving is essential to removing existing inhibitors of learning. Although this study highlights the importance of agreed-upon structures for solving

problems, as well as agreement on the problem and interest in collaborating to resolve it, the opportunity to note that norms enable single-loop learning, and thereby prevent individuals from engaging in double-loop or deuterio-learning. An agreement to collaborate may come easily, however, trust, accountability, and autonomy form a foundation upon which policies, procedures, norms, and values can be challenged freely and respectfully, advancing the possibilities of individual and organizational learning and novel solutions to systemic problems.

Study Limitations

As mentioned herein, the study population was a limitation of this research effort, in that positional leadership was not matched equally across both organizations. Crown Inc. participants primarily included mid-level and executive managers, whereas Risk Corps. participants occupied guest-facing customer service roles. This distinction is notable in that many Risk Corps. participants naturally spend less time on collaborative problem-solving efforts due to the nature of their work in resolving individual customer concerns.

The generalization of findings from this study is not possible. While the results may be characteristically associated with the organizations and subgroups represented in the study, these results cannot be generalized to other organizations.

Recommendations for Practice

This study provides insight that may be valuable for practitioners in the field. The following recommendations can be surmised from this research effort.

Agreement on the problem and agreement to collaborate in order to solve the problem cannot be overlooked or overstated in importance. Systems that provide a

framework for agreement may be implemented following a culture of trust, accountability, and autonomy—values that enable successful collaboration. Furthermore, agreement on the nature of acceptable, beneficial forms of conflict may support a team in forming agreements that promote effective problem solving.

In practice, leaders and managers must continue to advocate for and manage cognitive diversity as the problems faced by organizations today are more complex and intractable. By employing mediating cultural factors and investing resources in the a “culture first” environment, the benefits of cognitive diversity can be exploited for organizational gain and managed to minimize coping. Championing a strategic learning environment provides a context in which individual learning and social structures permit powerful higher-order learning engage, challenge, clarify, and optimize the shared resources available for problem solving.

Recommendations for Future Research

The study of problem solving and learning remains relevant and needed to advance organizational capabilities within an ever-changing marketplace. As such, the following recommendations for future research aim to advance the field’s understanding these theories in practice.

Additional research is needed to further explore the relationship between organizational learning capability and problem-solving style within other organizations, large and small, from various geographic areas. Research that continues to explore differences in the ways by which more adaptive and more innovative problem solvers catalyze organizational learning, to include research efforts that also investigate individuals with low organizational learning capabilities is needed.

The data presented herein emphasizes the importance of organizational culture as a foundation for an organization's ability to engage in all forms of organizational learning (single-, double-loop, and deuterio-learning), however research that examines the influence of problem-solving style on organizational culture, utilizing a culture instrument complement current research in the field.

This study highlighted several structures that were explicated as both limiting and enabling (i.e. time, money). Further research that aims to identify additional structures with the dual purpose of understanding the nature and typologies of these structures, and their implications for individual and collective learning.

Study Implications

Research on problem solving and learning must be elevated to explore the complex constructs and behaviors that influence the effort. This study underscores the importance of agreement to collaborate, as articulated in both articles as a prerequisite for problem solving. Swieringa and Wierdsma (1992) further suggest there must be an agreement and contract to learn—and unlearn—together. Advancing learning as an aim of organizational efforts, moving toward a learning organizational framework, elevates the importance of individual and collective learning as a means of remaining relevant and competitive in today's dynamic marketplace.

The findings of this study have implications for Crown Inc. and Risk Corps., as each organization examines their organizational goals and mission against the findings presented herein. For Risk Corps., these findings may inform their ongoing efforts to establish a culture that enables them to remain an industry leader in their field.

References

Kirton, M. J. (2011). *Adaption-Innovation in the context of diversity and change*. New York, NY: Routledge.

Kotter, J. P. (1996). *Leading Change*. Brighton, MA: Harvard Business Press.

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APPENDIX A: Survey Informed Consent

Researchers at Virginia Tech are interested in better understanding organizational learning. We value your input and would like you to complete the following inventory with regard to your experience as an employee of [Company Name]. The inventory should take less than 15 minutes to complete. It includes basic questions on organizational learning and demographic questions. You can read and answer these questions at your own pace.

We will also be working with BMGI to collect your KAI scores, which will be used in the analysis of data for this research study.

There is no requirement to participate, and there will be no compensation provided for your participation. You may stop participation in this inventory at any time. You may also choose to not answer specific questions. Your responses will be shared only with the study's authorized researchers unless you provide written consent. Your responses will be kept confidential to the fullest extent of the law.

The findings will help inform researchers about how individuals specifically contribute to organizational learning and possibly provide opportunities to develop resources to better promote organizational learning. Your firm may request a report of the results of this study; all reports will be voided of any information that may identify you personally. The results of this study may also be used in a dissertation and published in academic journals.

There are no known risks to participation in this study.

It is possible that the Institutional Review Board (IRB) may view this study's collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

If you consent to participating in this survey, and are willing to include your KAI score in the analysis, please indicate so by choosing "I agree to participate," and click the arrow at the bottom of the page to begin the inventory.

Questions or concerns?

For questions or concerns, please contact Sarah Hanks at sahanks@vt.edu or via phone at (509) 432-4842 or Dr. Curt Friedel at cfriedel@vt.edu or via phone at (540) 231-8177.

Should you have any questions or concerns about the study's conduct or your rights as a research subject, you may contact the VT IRB Chair, Dr. David M. Moore at moored@vt.edu or (540) 231-4991.

Consent to Participate

I agree to participate.

APPENDIX B: Survey Demographic Data

Please complete the following demographic information:

Note: All personally identifying information will be replaced with a unique ID before data is analyzed and reported.

First Name _____

Last Name _____

Gender _____

Age _____

Please complete the following questions regarding your educational and work experience.

Please select the highest level of education you have obtained:

High School Degree

Associate's Degree

Bachelor's Degree

Master's Degree

Doctorate Degree

Other

How long have you worked for [Company Name]?

- Less than one year
 - 1-2 years
 - 3-5 years
 - 6-10 years
 - 11-15 years
 - 16-20 years
 - 21-25 years
 - 25+ years
-

How long have you worked in the same industry or field?

- Less than one year
 - 1-2 years
 - 3-5 years
 - 6-10 years
 - 11-15 years
 - 16-20 years
 - 21-25 years
 - 25+ years
-

Please share your current position or title within [Company Name], as well as your department or unit:

Current position/title:

Department/unit: _____

Please indicate the three most recent positions you have held within [Company Name] (beginning with the most recent), and length of tenure (in years) in each position.

Position A: Job Title

Position A: Length of tenure (years)

Position B: Job Title

Position B: Length of tenure (years)

Position C: Job Title

Position C: Length of tenure (years)

How often are you encouraged to participate in training or development programs (i.e. workshops, conferences, etc.) that are supported by [Company Name]?

- Never
 - Once every few years
 - Once per year
 - Twice per year
 - Three times per year
 - Four times per year
 - More than four times per year
-

How often do you participate in training or development programs (i.e. workshops, conferences, etc.) that are supported by [Company Name]?

- Never
 - Once every few years
 - Once per year
 - Twice per year
 - Three times per year
 - Four times per year
 - More than four times per year
-

Page Break

Please indicate below the teams within [Company Name], or in collaboration with other organizations, that you participate in as a part of your responsibilities in your current position.

Descriptive Name of Team A

Is this team internal to [Company Name] (Y/N)?

Descriptive Name of Team B

Is this team internal to [Company Name] (Y/N)?

Descriptive Name of Team C

Is this team internal to [Company Name] (Y/N)?

APPENDIX C: Interview Protocol

1. Tell me about your role and work at [Company Name].
2. Tell me about how you and your team work together.
3. How would you describe the work environment and the organizational culture at [Company Name] and more specifically, within your department or facility?
4. Tell me about any group norms or rules, written or unwritten, that are in place both organizationally for [Company Name], as well as within your facility.
5. How are rules and group norms developed, and by whom? Have they been adapted or changed, during your tenure or otherwise?
6. Does your team have a set of agreed upon values that guide your work together?
7. Do you feel like the group norms and rules, both written and unwritten, are understood and observed by all members of the team? And if not, are there individuals that have interpretations that are different than your own?
8. Do you perceive you and your team have a common system for utilizing symbols or shortcuts that help you to understand and evaluate problems in the workplace?
9. Have you experienced a time when you and your team questioned or modified existing policies, norms, and procedures in order to solve a problem?
10. Does your team have a formal or informal problem-solving process?
11. Think about a particular problem your team has worked on together. Please share your experience working through the problem, using the problem-solving process you described.
12. How frequently are “how” and “why” questions posed before a solution is implemented?
13. Describe an experience in which someone or something inhibited or was a barrier to asking or addressing “how” and “why” questions?
14. Describe a time when you or someone else may have learned something but didn’t share that learning with the team or with others in the company.

APPENDIX D: A Priori Propositions Table

A Priori Propositions Utilized to Develop Interview Protocol

Proposition	Supporting Literature	Related Interview Questions
#1 Differences in the development and modification of learning frameworks and shared mental models, influenced by implicit and explicit rules and past experiences, impact the problem-solving and learning processes as they govern the recognition, processing, and recall of information.	An organization, as defined by Nonaka (1994), is a “system that ‘processes’ information or ‘solves’ problems” (p. 14) by engaging a set of rules that prescribe the way individuals behave (Hayes & Allinson, 1998; Swieringa & Wierdsma, 1992). Rules as norms, along with an individual’s worldview, influence the development of shared mental models that provide some agreed-upon criteria for resolving technical and more complex problems (Kim, 1993).	Does your team have a set of agreed upon values that guide your work together? Tell me about any group norms or rules, written or unwritten, that are in place both organizationally for [Company Name], as well as within your facility.
	Shared mental models serve as necessary structures that enable an organization to learn, accounting for the many interconnections between its members, and an organization’s memory useful (Kim, 1993).	How are rules and group norms developed, and by whom? Have they been adapted or changed, during your tenure or otherwise?
	Shared mental models aid in the transfer of tacit knowledge and provides cues for learning opportunities that influence the recognition and framing of a problem (Nonaka, 1994).	Do you feel like the group norms and rules, both written and unwritten, are understood and observed by all members of the team? And if not, are there individuals that have interpretations that are different than your own?
	Double-loop learning necessitates changes in	Do you perceive you and your team have a common system for utilizing symbols or shortcuts that help you to understand and evaluate problems in the workplace?

<p>#2 Individual preferences in approaches to and engagement in the problem-solving process may influence the typologies of organizational learning and the process by which individual learning becomes organizational.</p>	<p>norms, values, beliefs, and worldviews as a means of correcting errors. Defining group norms and values, as well as changed in these defining organizational frames, is necessary in order to determine if the necessary conditions for double-loop organizational learning are present (Argyris & Schön, 1996; Hedberg, 1981).</p>	<p>Have you experienced a time when you and your team questioned or modified existing policies, norms, and procedures in order to solve a problem?</p>
	<p>Diversity of problem-solving style creates</p> <p>Hayes and Allinson (1998) posit that</p> <p>Individual learning must be socialized and organizations must deploy systems that allow individual knowledge to become embedded within the policies, procedures, and culture of an organization; this framing places individual learners at the center of a learning process that is enabled at an organizational level (Kim, 1993).</p> <p>Lyles and Schwenk (1992) suggest that individual thinking and cognitive processing, including the development and utilization of shared mental models, contributes to strategies at an organizational level that support problem formulation and the</p>	<p>Does your team have a formal or informal problem-solving process?</p> <p>Think about a particular problem your team worked on together. Please share your experience working through the problem, using the problem-solving process you described.</p> <p>How frequently are “how” and “why” questions posed before a solution is implemented?</p> <p>Describe an experience in which someone or something inhibited or was a barrier to asking “how” and “why” questions?</p>

development of a resolution.

#3 An organization's culture serves as the foundation for embedded systems and structures that enable or inhibit organizational learning and define problem-solving processes.

Dodgson (1993) contends that the relationship between culture and individual and organizational learning warrants further investigation, although Fiol and Lyles (1985) assert that culture is one of the major contextual factors that predicts behavior and influences the learning capacity of an organization. Culture serves to anchor other contextual factors, such as structure, strategy, and internal and external environmental factors (Fiol & Lyle, 1985).

Team me about how you and your team work together.

How would you describe the work environment and the organizational culture at [Company Name] and more specifically, within your department or facility?

#4 The use and frequency of "how" and "why" questions indicate that the conditions necessary to conduce organizational learning may be present.

Argyris and Schön (1996) argue that double-loop and deuterio-learning occur infrequently and the markers make both forms or organization learning hard to identify. Dodgson (1993) suggests that these forms of organizational learning necessitates a consideration of how and why to change, making these questions possible indicators of double-loop and deuterio-learning.

How frequently are "how" and "why" questions posed before a solution is implemented?

Describe an experience in which someone or something inhibited or was a barrier to asking or addressing "how" and "why" questions?

#5 Inhibitors of organizational learning may include a lack of motivation to cope with cognitive diversity or a complex paradox of structure that limits learning.

Argyris and Schön (1978) suggest that learning is inhibited when there is a disconnect between thoughts and actions. In the context of cognitive diversity, a lack of

Describe a time when you or someone else may have learned something but didn't share that learning with the team or with others in the company.

motivation to cope or structures that are both limiting and enabling may result in a lack of learning at an organizational level (Kirton, 2011).