COLLABORATIVE LEARNING AIMED AT

ENSURING PSYCHOLOGICAL SAFETY IN HIGH RELIABILITY TEAMS

by

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Abstract

High reliability teams learn from failures. Although research exists on collaborative learning and high reliability teams, minimal research exists specifically addressing both concepts in one study. This grounded theory study examined collaborative experiences of high reliability team members in an intelligence agency. The intelligence community environment underscores the importance of a risk-free atmosphere where questioning and problem solving are pervasive. By the use of grounded theory methodology, participants experiences generated a starting point to understand how collaborative learning ensures psychological safety in high reliability teams. Analysis discovered five catalysts that facilitate a psychologically safe environment where the ability to learn from failures is paramount to continued success. Through a closer examination of the participants experiences, dimensional constructs emerged further defining the catalysts. The findings indicated that by weaving the capacity to negotiate differences throughout the entire team process team members were able to incorporate multiple viewpoints to develop one product. The holistic approach to collaborative learning ensures a psychologically safe environment for high reliability teams.

Dedication

This effort is dedicated to those family and friends who have helped me through this journey. To Gary, my husband and friend, thank you for all the extras you have done, for the strength you have shown me, and for the many cups of tea, you have brought me along the way. To my daughters, Alexandra and Danielle, who have been inspirational to me through the many late nights and long days and for the many times I could not figure out a word I needed, you were there. In addition, the nights you road with your Dad to pick me up from the late night classes when sleeping in your warm beds was calling you. To my Mom and Dad, thank you for setting such a fantastic example as parents and as caring and motivated people who are intensely determined in their convictions and lives.

To all of my family and lifelong friends, you have encouraged, supported, and uplifted me. I am so grateful for your kindness and love. I cannot imagine how hard it would be to complete a journey like this without your care. I wish I had room to mention you all by name, please know that you are in my heart. You all have helped me stay strong even when I felt marginalized and unable to type one more word. You all have inspired me through to the end. You all were there for me. Thank you!

And to that point, for so very much thank you God!

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CHAPTER 1. INTRODUCTION

Background of the Problem

Information exchange in a collective environment hinges on acknowledging and incorporating divergent perspectives in order to build a shared knowledge base. Work conducted by intelligence teams necessitates an atmosphere of collaboration, where as a team they identify targets; recognize patterns, form judgments, and forecast (Straus, Parker, & Bruce, 2011). The United States intelligence community (IC) uses experts with diverse knowledge sets as interdependent work groups. These groups generate outcomes, many used by senior policy makers that, although developed by a group of individual experts, have accountability as a team (Hackman & O Connor, 2004). The collaborative capacity that incorporates unique knowledge from diverse team members requires an unthreatening atmosphere.

Collaborative learning emphasizes interaction among peers, individual and group accountability, and responsibility for team learning through active engagement (Barkley, Cross, & Major, 2005). Cognitive processes such as critical thinking and problem solving have created a growing interest in collaborative learning research (Barkley et al., 2005). These cognitive processes facilitate learning from failures through operational and relationship sensitivity within the working environment (Tjosvold, Yu, & Hui, 2004; Weick & Sutcliffe, 2007). Weick and Sutcliffe (2007) characterized high reliability teams as having the ability to (a) defuse their inclination to conform, (b) be imaginative, and (c)

learn the importance of being skeptical. This research examines how members of these teams create conditions to ensure a psychologically safe environment that fosters their ability to learn.

Statement of the Problem

While educational psychology is about the study of how humans learn, it is also about the environment in which they learn (Seifert & Sutton, 2009). Workplace teams exist in environments where barriers make learning difficult and learning from failure can become an almost an overwhelming effort (Cannon & Edmondson, 2005). Research in collaborative learning has thoroughly studied teams in the academic world, yet has lightly touched on how high reliability teams learn. Previous studies on both teamwork and learning from failure in high reliability environments include health care delivery, aviation crews, wild land firefighters, aircraft carriers, air traffic control, NASA, and nuclear power plants (Edmondson, 1999, 2003, 2004a, 2004b; Flin, O Connor, & Mearns, 2002; Nembhard & Edmondson, 2006; Riley, Davis, Miller, & McCullough, 2010; Weick & Sutcliffe, 2007; Wilson, Burke, Priest, & Salas, 2005). Organizational, team, and management research generated literature emphasizing the influence of human factors over technical issues. The focus has been primarily on behaviors (Edmondson, 1999), shared mental models (Cannon & Edmondson, 2001), team cognition (Cooke, Gorman, Duran, & Taylor, 2007; Wilson, Salas, Priest, & Andrews, 2007), team learning from experience (Kayes, Kayes, & Kolb, 2005), peer feedback impact on learning (Gielen, Peeters, Dochy, Onghena, & Struyven, 2010), and leadership (Roussin, 2008). These team variables are supported by a substantial amount of research describing the nuances and validity of their relevance to the area of team science.

The intent of this grounded theory study is to identify the typically unspoken psychological safety factors that characterize collaborative learning efforts. These tacit beliefs create an atmosphere in which team members confront issues and resolve problems, particularly in high reliability teams. It is through this collaborative learning orientation that potential barriers are overcome and teams remain highly reliable. Research has shown that in a psychologically safe environment, a shared belief develops without the fear of consequences or blame (Cannon & Edmondson, 2001, 2005; Carmeli, 2007; Carmeli & Gittell, 2009; Detert & Edmondson, 2011; Edmondson, 2004a). Cross-disciplinary research on high reliability teams further highlighted the necessity of training, communication, the importance of teamwork, and learning from errors (Baker, Day, & Salas, 2006; Riley et al., 2010; Weick, 1993, 1995; Weick & Sutcliffe, 2007). However, the research debate has not devoted adequate attention to the development of psychological safety. Thus, we do not have a good understanding of the development of psychological safety within the collaborative learning environment. The emergent theory from the research will advance the scientific knowledge base by examining the process to ensure psychological safety, thereby increasing the effectiveness of teams through collaborative learning. The connection between collaborative learning and psychological safety is apparent, yet gaps exist in how psychological safety is developed.

Purpose of the Study

The purpose of this study was to understand how collaborative learning contributes to fostering psychological safety within high reliability teams and bridge the dearth of theory. The study focused on collaborative learning in an analytic national security environment where integrated teams of experts leverage their knowledge and

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skills to produce solutions to fill intelligence needs (as stated in the agency s report for 2012). In this challenging world, change is constant (Puvathingal & Hantula, 2012). Learning is critical to solve emerging problems and conduct predictive analysis (Tetlock & Mellers, 2011). With the focus on high reliability teams, this study seeks to understand the relationship of collaborative learning and psychological safety in the complex world of an agency in the national security environment.

Significance of the Study

This study explores the collaborative learning framework to develop a theory built on the experiences of adult learners in a work environment where team members create a psychologically safe environment. The researcher worked with members of high reliability teams at a defense agency (herein after called *agency*) to determine what features develop a collaborative learning environment in which team members feel safe enough to problem-solve together. Prior research on collaborative learning typically has focused on teams of students in the traditional, academic environment and at various developmental stages (Janssen, Kirschner, Erkens, Kirschner, & Paas, 2010; Seifert & Sutton, 2009). This study focuses on the experiences of adult team members in the work environment where the potential exists for the accomplishment of collaborative learning as the result of feedback, reflection, and change (Edmondson, 1999), group experience (Kayes et al., 2005), and social interactions (Knapp, 2010).

The value of this study is in its potential to understand how collaborative learning contributes to fostering psychological safety within high reliability teams (HRTs) and bridge the dearth of theory. The knowledge generated through this research can assist teams and their members to build an environment of collaboration, integration of

expertise, and resilience in the dynamic and uncertain atmosphere in which they function. This research contributes to the efforts to improve intelligence analysis through collaboration, trust, and a level of confidence required for successful analyst-to-analyst interaction and information sharing (Immerman, 2011; Puvathingal & Hantula, 2012).

The practical insights gained from this study will help analysts learn, listen, reflect, and speak-up when striving to elucidate the unknown. The analysis conducted by the analytic teams is produced in an environment where complexity, data ambiguity, and reduced timelines are met with an expectation of valid and accurate conclusions (Heuer, 2006; Immerman, 2011). The development of a process aimed at ensuring psychological safety in a collaborative learning environment will affect how team members perform their analysis, drawing from a broader and more integrated perspective.

Research Design

The study s main emphasis is to progress beyond descriptions and generate a theory on how collaborative learning evolves. This collaborative theory was shaped in a somewhat chaotic and ambiguous atmosphere where coordination and interdependent behaviors are required. The development of this theory generated from the personal experiences of team members in this collaborative environment. The approach that allows an individual s verbal experience to emerge is qualitative research (Corbin & Strauss, 2008). The study s methodology is grounded theory using the constructivist paradigm. The grounded theory approach employs a flexible and continuous collection and analysis of data with comparative and inductive interpretations by the use of codes and categories (Charmaz & Henwood, 2010). Constructivist grounded theory approach emphasizes

interrelationships, multiple perspectives, and the complex world in which the participants and data thrive (Corbin & Strauss, 2008).

The use of grounded theory design provides the framework to develop a systematic and comprehensive data collection and analysis method (Patton, 2002). From this design, an understanding of the development of collaborative learning and psychological safety was grounded in the participant s experiences. Past research suggested that learning in a collaborative manner means an individual exhibits an enculturation that creates knowledge from feedback, experience, and negotiation (Bruffee, 1995; Edmondson, 1999). This study is comprised of pertinent data from the individual team member s perspective examining their lived experiences in the natural setting. The focus on collaborative learning is rooted in educational psychology through relationships, interactions, and discovery processes (Hoy, 2002). By highlighting the experiences of a high reliability team of geospatial-intelligence professionals, the study will expand the current knowledge and understanding of collaborative learning from the academic to the world of intelligence professionals.

The complex nature of collaborative learning requires the flexibility of grounded theory methodology to gather multiple personal perspectives and to analyze the data through an adaptive and layered research process (Corbin & Strauss, 2008). The key principles of grounded theory change and choice, guided the research much as it does during the daily events in the lives of those studied (Corbin & Strauss, 1990). The interactions and social settings are not static so change and flexibility are incorporated in the study by way of constant comparative analysis and an inductive and abductive methodological approach (Charmaz & Henwood, 2010). The analysis of words into

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codes, into patterns, and back again is the flexibility and change created when constantly comparing the transcripts and reviewing the recordings in order to find the patterns and relationships.

Research Question

The research question developed to guide this study is as follows: How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety?

Assumptions and Limitations

The researcher assumed

- There would be sufficient participation from the selected team;

- The participants would understand the terms used in this study and competently describe events in response to the questions;

- Due to the nature of their work, the selected team utilizes the principles and techniques of high reliability teams;

- Team members have experienced interactions, events, or processes, which allowed psychological safety to evolve in a collaborative environment.

Methodological assumptions are

- Participants participate on a functioning team;

- Team members would accurately describe their experiences;

- The collection of extensive codes from the interviews would create numerous themes and relationships, potentially making analysis difficult. This extensive collection of data is valuable for theory generation.

The study used employees from one intelligence agency who have participated on integrated working groups and other analytical teams for sample purposes. While this may assist in theory creation, it also limits the input to a single perspective. If events,

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personalities, or behaviors have created a negative environment, this could be reflected in the responses. In addition, since the participants are employees of an intelligence agency, their responses may not include all information on contextual events because of security requirements. Since the researcher is unfamiliar with the participants and their background, including length of service at the agency, the potential exists for some members to be recently hired and unfamiliar with the flow of information within the team and the agency. A further limitation to research within this intelligence environment is that it may not generalize to the population at large.

A limitation from the researcher s point of view exists in the potential for interpretive bias based on individual experience and perspective. The use of the participants words (Corbin & Strauss, 2008) and by constantly comparing the data (O Connor, Netting, & Thomas, 2008) the researcher was sensitive to potential biases and preconceptions.

Definitions of Terms

The context of this study requires the definition of several terms: collaborative learning, high reliability teams, psychological safety, intelligence analysis teams, team learning, competencies, and unexpected event.

Collaborative learning. A situation where team members work together to perform a task or to resolve a problem and with these joint efforts, learning occurs (Janssen et al., 2010). Team members are responsible for task completion, learning, and the development of solutions to the problem (Gokhale, 1995). Collaborative learning is a mutual, continuous effort in which team members perform a task and through these combined effort achieve joint success (Gokhale, 1995; Janssen et al., 2010).

High reliability teams (HRTs). Teams that work in environments where stakes are undeniably high, have less than their fair share of errors, and recognize the necessity to channel human flexibility to avert errors (Reason, 2000; Weick & Sutcliffe, 2007). These teams consisted of two or more individuals, who work interdependently and exhibit high quality behaviors continually in complex and stressful situations (Wilson et al., 2005).

Intelligence team. Intelligence teams are work teams that conduct intelligence analysis (IA). IA interdependent work teams generate a product working as a collective (Hackman & O Connor, 2004). Each member brings her/his own expertise and experience, interpreting the data from one s own perspective. IA teams conduct analysis employing cognitive methods and social processes to produce reports (Hackman & O Connor, 2004).

Psychological safety. Psychological safety is a psychological state in which an individual perceives what his/her capacity is to take calculated chances, speak up, make a mistake, and give feedback without the fear of rejection, loss of position, or the pressure to conform (Edmondson, 2004b; Kahn, 1990). Within teams, this group norm conveys a shared conviction of safety to question the status quo, take risks, and members are able to disagree without the fear of being condemned, reprimanded, or lose their position (Edmondson, 1999; Kahn, 1990). Members are confident in the team s mutual respect and trust for the team as an entity (Edmondson, 1999).

Team learning. Team learning is the adaptation of existing skills to solve unexpected problems (Kayes, 2002). It is a process using reflection, feedback, experimenting, and questioning to determine gaps or errors in beliefs or outcomes

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(Edmondson, 1999). Learning occurs when the team creates solutions during the development of its complex products (Kayes, 2002).

Unexpected event. An unexpected event is a surprise, something that is not anticipated; something occurred or did not occur as expected (Johnston, 2005). When conducting analysis, an unexpected event may require reviewing a magnitude of information in a condensed timeframe. This unexpected event may also require an exploration of cultural nuances or adversarial intent requiring examination. Within this context, the challenge is to develop the complete hypotheses and not misjudge behaviors (Hackman, 2011).

Expected Findings

The expectation was that this research would find a process internal to the team on (a) how lessons learned are accepted and shared without blame, and (b) the toleration of a risk factor is understood as key to growth outside of the academic descriptors of collaborative learning and psychological safety. It was hoped that the study would capture the specific process used within IA teams to respond to crises, learn, and adapt. It was anticipated that these findings would augment current team development training with a method describing how to foster psychological safety in collaborative learning in the high reliability team environment.

Organization of the Remainder of the Study

There are five chapters in this study. Chapters 1 and 2 develop the story of this study. Chapter 1 introduces the problem through a brief discussion of the current framework, the significance of the study, as well as the methodological approach,

assumptions and limitations, and definitions. Chapter 2 provides a review of related literature and creates the foundation of the findings in literature relating to collaborative learning, high reliability teams, and psychological safety. This comprehensive review builds the background on learning from errors in high reliability teams and discusses collaborative learning and the influence of psychological safety on teamwork.

Chapter 3 presents the design and methodology used in the study. This chapter describes the methods and procedures in detail, including the target population and the study participants. The collection instrument is described for this study, which consists of questions to be used in an oral interview. This section includes the development process for the interview questions and a description of the expert review process. A description of the data collection and analysis procedures including coding, mapping of relationships, and feedback from participants is discussed.

Chapter 4 in this qualitative, grounded theory study describes the data collection and analysis process. This chapter also presents the methodological process applied, any issues that occurred, and the results of the open, axial, and selective coding along with snapshots from the transcripts. To close out this chapter, the matrix and final theory are presented.

To summarize the research, Chapter 5 highlights the data and conclusions and provides recommendations for future research.

CHAPTER 2. LITERATURE REVIEW

Introduction to the Literature Review

Communication at work occurs continuously and is the essence of an organization s existence. When working with others, individually or on teams, communication contributes to learning. This learning occurs from personal experiences, for students in class both individually and within groups, and throughout life. Social constructivists believe social interaction increases cognitive development and learning (Nyikos & Hashimoto, 1997). However, simply creating a group or team does not create the atmosphere necessary to promote collaborative learning (Dillenbourg, 1999). This literature review introduces the concept of collaborative learning in relationship to high reliability teams. Through the mediation of social interactions and relationships, high reliability team members enhance their learning capabilities and decrease the potential for errors (Carmeli & Gittell, 2009). The structure of this literature review revolves around the three main concept areas as described in Chapter 1. It focuses on the concepts of high reliability teams, collaborative learning, and psychological safety.

Theoretical Orientation for the Study

The theoretical orientation for this study transpires in the intelligence world. The three separate concepts embark on separate literature paths and through analysis develop into an interwoven premise. The three research paths have a substantial amount of work

conducted that explores their separate dynamics. Within the context of this study, these paths merged into the realm of intelligence analysis as experienced at the agency.

The theoretical framework was grounded theory methodology. Through the methodological process, the conditions, team member s reactions, and any consequences during their daily operations formed the basis for theory generation (Corbin & Strauss, 1990). Using the transcribed interviews, the participants lived experiences evolved into the collaborative learning experiences, which gave this research rigor and credibility.

The analysis began with data collection through the recorded interviews that described incidents experienced within the team environment. The participants highlighted critical components of their high reliability team structure and process. These components included introducing shared knowledge and expertise, encouraging different viewpoints and the use of constructive feedback, incorporating diverse opinions to develop an accurate product, and pursuing innovation and accountability from all team members. During the data collection phase, theoretical sampling and constant comparative analysis thrived. With theoretical sampling, this research used a consistent collection process to ensure the conditions, interactions, and results illustrated the phenomena under research (Creswell, 2007).

Throughout the collection process, the search for patterns within the descriptions, whether comparable or dissimilar, guided the analysis integration and data interpretation (Corbin & Strauss, 1990). The interviews and the analysis were compared and labeled, separating the phenomena into phases guided by the participants words. The researcher guarded against bias by the use of theoretical memos from the first interview, through the coding, mapping, and analysis all along the process through to the conclusion.

Theoretical memoing assisted the researcher with capturing coding snapshots, helping to integrate ideas, and personal collaboration tool by gathering thoughts when the research began and throughout the theory emergence process (Corbin & Strauss, 1990). The grounded theory structure and analytic processes gave flexibility and reliability to the development experience (Creswell & Miller, 2000). The use of personal interviews as the primary method of data collection allowed the interpretation of the participants experiences to explain how collaborative learning evolved through more than simply regurgitating their words.

Grounded theory builds from rich data revealed through the participants words and defined experiences, not simply through an all-encompassing literature review. The theory emerged from layers of analysis. The multiple layers encompassed the organizational layer, team, and the personal level of experience. The personal layer included the requirement to understand the connections between the participants responses, the meanings within the responses, and the organizational setting, culture, and language (Charmaz, 2006).

This research adds to the knowledge on collaborative learning specifically in high reliability teams. Team and small group literature examines workplace teams, particularly through the lens of people, process, and systems. While there is an expectation that all three factors influence the work experience, this study looked closely at the personal aspect of the workplace through the lens of team learning and psychological safety.

<center>**Review of Research Literature**</center>

High Reliability Teams

   The representation of research on high reliability teams originates in environments where the potential exists for severe consequences from an error or failure, yet they seldom occur (Weick & Sutcliffe, 2007). Providing a foundation to understand high reliability teams begins by learning about high reliability organizations. High reliability organizations (HRO) are characterized as having the ability to maintain an increased performance level for long periods of time when there is an overwhelming threat of errors or disasters, which seldom occur (Weick & Sutcliffe, 2007). Competing priorities reduced funding, and the complex nature of intelligence analysis demand reliable products to ensure terrible accidents do not occur and continuous learning takes place.

   Weick and Sutcliffe (2001) described high reliability organizations as those who

- foster redundancy by having back-ups where more than one person holds the knowledge and skills necessary to complete the task,

- demonstrate a culture of learning,

- emphasize competence,

- exhibit situational awareness through sense-making,

- utilize flexibility to coordinate personal expertise within the decision system without being mindful of rank or title,

- understand and build from lessons learned to avoid previous mistakes implemented into processes to ensure they do not occur again, and

- demonstrate the ability to think and recover when necessary under stress or in crisis.

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Weick and Sutcliffe (2007) described high reliability organizations as those able to deal effectively during crisis events because they have dealt with chaos and learned from the consequences of their actions.

Extensive research on high reliability theory has been conducted in health care and the aviation industries. Looking specifically at health care and using simulation studies, Miller, Riley, and Davis (2009) identified key nursing behaviors and team performance indicators used during critical events. These interdisciplinary teams needed to employ technical competence along with a shared mental model, focused communication loops, situational awareness, and consistent feedback skills. When patient safety errors occurred, these inter-relational skills had not been observed (Miller et al., 2009).

After the NASA Columbia Accident in 2003, an investigative board used high reliability team traits to review the culture. The determination found the lack of a strong safety culture and recommended they readopt several HRO characteristics (Boin & Schulman, 2008). In line with technical competence, key characteristics recommended included acknowledging personal responsibility for safety, valuing caution while creating improvements, respect to being alert for small changes, and complacency with a search for contradictions. Studies on high-performing teams determined members share characteristics, individually coordinate actions, recognize cues, and anticipate each other s needs (Yen, Fan, Sun, Hanratty, & Dumer, 2006). High reliability teams manage the unexpected to understand cause and effect without breaking down completely and still recover quickly.

Intelligence teams at the agency support a large mission, which includes national security priorities, safety of navigation, war fighter support, humanitarian, and disaster relief across the globe (as stated in the agency s report for 2011). The agency challenged the workforce to learn and innovate. The development of learning cells or incubators (as stated in the agency s report for 2011) helped build an integrated analytic environment that uses diverse tool sets, deeper contextual analysis, and operational solutions. The agency is committed to learning and improving its mission set especially as unexpected problems or lapses in reliability happens.

In October 2012, the agency assisted the Federal Emergency Management Agency (FEMA) during the rescue and recovery efforts for Hurricane Sandy (as stated in the agency s report for 2013). Afterward, the agency conducted reviews of their processes and procedures. The analysis was conducted to determine more efficient and faster methods with unclassified support to FEMA and the first responders to focus search and rescue efforts (as stated in the agency s report for 2013). The culture of learning at the agency proved effective in May 2013, when a tornado with the strength of an Enhanced Fujita (EF) scale rating of EF5 struck Moore, Oklahoma. From lessons learned, the agency utilized the new techniques within an analytic environment in partnership with open source and social media to create the first unclassified version of online products, thereby providing situational awareness in real time (as stated in the agency s report for 2013). The complex environment of the intelligence community demands effective teamwork and communication, a culture that acknowledges the potential for human factor errors.

Collaborative Learning

Historically, an extensive amount of research has been conducted on collaborative learning and the effect on the learning environment, curriculum, student groups, and overall student success in the classroom (Barkley et al., 2005). From the pedagogical perspective, evidence has shown that students build their understanding of learned concepts by actively participating in and by making connections, not just from the world around them, but also from what they already know, which is their schema. Early research described the collaborative learning environment as one where negotiated relationships build upon team member interrelationships and where the learning behaviors such as risk-taking and asking questions are encouraged (Bruffee, 1995). Dillenbourg (1999) added that the theory of collaborative learning involves the interactions between individuals through the relations between the situation, interactions, processes, and effects.

Bruffee (1995) described learning as participation through re-acculturation. He explained re-acculturation by different roles individuals play when moving from one group to another and learning the various cultures, values, and knowledge he/she joins. The collaborative learning process includes group governance, group accountability, and the lack of teacher interference. In collaborative learning, individuals do not strive to accomplish more or have better grades than a group member. Instead, the desire is to succeed as a group (Bruffee, 1995). Knowledge within these groups is a negotiated process where members learn through social questioning   taking a new path to resolve a problem, and the use of the strongest tool, dissent, when necessary.

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Vygotsky (1978) and Bruffee (1995), social constructivists, theorized that social interaction is required for cognitive development and self-regulation. Furthermore, social constructivism posits that knowledge was created and negotiated through peers, each possessing individualized backgrounds, and experiences. This individualized knowledge construction, along with the process of self-regulation and interaction with others, assists an individual to become capable of expressing his/hers thoughts when solving problems (Nyikos & Hashimoto, 1997).

Vygotsky believed that interaction and the cultural environment facilitate learning and growth when it occurs within the zone of potential development (Nyikos & Hashimoto, 1997). The zone of proximal development (ZPD), developed by Vygotsky, refers to cultivating learning through collaboration with a more skilled individual (Chaiklin, 2003). An illustration of the ZPD theory would portray an intern with the requisite education, placed within a team of imagery scientists. Not only does the intern learn from the experts, he/she would also provide the experts with new ideas and understandings. In this mutually beneficial environment, the potential exists for discovery of unknown data and even different ways of understanding the implications of objects within an image.

Research conducted by Stahl (2000), and Singh, Hawkins, and Whymark (2007) facilitated development of a model for the process involved in collaborative learning and the underlying factors of collaborative knowledge building (CKB). The CKB model explores the practice of reflection at stage and member interaction, creating shared understanding at stage. The CKB model depicts the individual and group processes as separate, yet they are interwoven at various times during the generalizing process (Singh

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et al., 2007). Introducing this work in the context of collaborative learning research illustrates the emphasis on social interaction as a precursor for learning. Similarly, Bruffee (1995) described collaborative learning as negotiated relationships utilizing group discussions, consensus building, and further emphasized that the interaction among peers is where learning occurs. In addition, research conducted by Dillenbourg (1999) incorporated four elements into the work on collaborative knowledge building. The elements and criteria are

1. The situation

   - Symmetry of action, knowledge, and status;

   - Common or shared goals; and

   - Division of labor.

2. Interactions

   - Interactivity the extent that cognition is influenced that is, two individuals create one product, starting at different points yet completing the project with all end points matching;

   - Synchronicity synchronous communication that is, Jabber, Chat, face-to-face, video teleconferencing (VTC); and

   - Negotiability membership is equal, ambiguity free communication, structured roles, allowing all members to voice opinions and concerns.

3. Processes

   - Induction use of individual s personal experiences and create a joint understanding through expressions, language, culture;

   - Cognitive load division of labor reduces the individual processing levels;

   - Self-explanation; and

   - Conflict feedback and issue resolution.

4. Effects

- Did collaboration create measureable concept changes? and

- Is the collaborative effect transferable to other teams when members move throughout the organization?

Dillenbourg (1999) pointed out that although two or more people interact, learning may not trigger and the anticipated interaction may not occur. Interpersonal risk taking, trust, and mutual respect facilitate a team climate where collaborative learning is an operational imperative.

Psychological Safety

This study examined psychological safety as a factor that affects team learning and the overall perception of individual members to challenge and innovate. Kahn (1990) described the experience of psychological safety for individuals as the ability to feel comfortable enough in their environment to take risks, exhibit their true thoughts, feelings, and ideas without fear of negative consequences. Specifically, studying teams and the affect of psychological safety adds the factor that safety is a belief shared by the entire membership, yet the atmosphere does not resemble group cohesiveness (Edmondson, 1999). Group cohesiveness does not challenge ideas of team members. Team members will comply with consensus even when they feel unsure, fearing punishment because they questioned the norm (Janis, 1982). In high reliability teams, Weick and Sutcliffe (2007) characterized members as having the ability to be imaginative, diffuse their inclination to confirm, and know the importance of being skeptical.

For a team to experience psychological safety in a work environment, the following factors must be present: trustworthiness, security, predictability, clarity of

expectations, and confidence that punishment, rejection, nor embarrassment will descend upon them when questioning the norm (Edmondson, 1999). As noted, high reliability teams are complex, typically interdisciplinary efforts. The context associated with these high reliability teams within the intelligence community has objectives, where if a breakdown in teamwork occurs, dire consequences may transpire. When team members problem solve, concerns about interpersonal safety and the willingness to speak up may intensify, especially among the less experienced members when the teams have an unequal power structure (Edmondson, 2003). Nembhard and Edmondson (2006) describe a work environment where leadership demonstrates this safety factor the employees feel valued and all individuals exhibit:

- trust toward each other,

- a supportive atmosphere,

- engage in feedback,

- openly discuss challenges and questions,

- risk taking especially for innovation and receptive to new or different thoughts and ideas,

- the ability speak-up to mitigate power imbalances, and

- member inclusiveness.

The challenge is for IC high reliability team members to always speak up, take risks, and continue to learn and build skills, even during unpredictable and unexpected events. Understanding how collaborative learning ensures psychological safety can have a critical influence on high reliability teams when crises occur and time is at a premium. The study seeks to theorize on the development of psychological safety from team members perspective.

Research Findings and Critique

The research process for high reliability teams and organizations, collaborative learning, and psychological safety employed qualitative, quantitative, mixed methodology, and action research. The research designs varied from surveys alone or those with open-ended questions, group observations in search of behavioral dynamics, field studies, and semi-structured interviews. A common theme in the design of high reliability and psychological safety studies has been the use of participants in the workplace. The majority of the studies on collaborative learning utilize participants in the classroom. To answer the research question, the study used grounded theory methodology, employing individuals who have actively participated in high reliability teams.

The grounded theory method of inquiry draws on the experiences of government employees of the agency who have participated in high reliability teams. For the collaborative learning atmosphere to be understood from the participant s perspective, it required the flexibility, adaptability, and layered research approach of grounded theory (Corbin & Strauss, 2008). The participants descriptions of experiences and interactions created the foundation block of theory development. The agency personnel adapt to the ebb and flow of requirements, respond with strength in crises, and learn from past efforts to focus rescues and eliminate redundancies (as stated in the agency s report for 2013). Functioning in this environment creates a common language with socially accepted meanings and processes.

Grounded theory research is appropriate in this context because the study subscribes to the two foundational principles: change and choice. The first principle is

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adaption to change much like in the lives of those involved in the study (Corbin & Strauss, 1990). Change in grounded theory methodology relates to the lack of static process through the flexibility involved in comparative analysis in search of patterns and relationships (Charmaz & Henwood, 2010). As the process moved, so must the way the research was conducted. As the participants use lessons learned to improve their support, team members change, new members come on board, and the methodology adapted to the changes.

The second principle of choice (Corbin & Strauss, 1990) stems from the participant and researcher s perspectives. The interviews contained the actions and reactions described by the participant s from memories of the experiences. The researcher determined connections, relationships, and patterns from the described experiences are selected as having value for theory generation. These choices grounded in the participant s words and interpreted by the researcher guide the conceptualization theory.

The inductive nature of the study supported the flexibility and choice necessary when searching to understand collaborative learning in high-risk environments. Learning from errors, teamwork, and the critical need for achieving the stated outcomes, underscore the importance of collaborative learning (Edmondson, 1999, 2004b; Kayes et al., 2005; Nembhard & Edmondson, 2006) in this integrated, collaborative environment. The collaborative learning construct provided a theoretical perspective to examine psychological safety in high reliability teams. Edmondson (1999) described the team learning process as actionable, using feedback and reflection to change the course of action, if necessary. High reliability teams must integrate different perspectives to

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coordinate their actions (Baker et al., 2006), and make connections in a clear and plausible fashion to have successful problem resolution (Weick, 1995).

This atmosphere necessitates a psychologically safe environment where productive discussions concerning errors and support for risk-taking are encouraged (Edmondson, 1999). Collaborative learning criteria have relevance to psychological safety. Those criteria being synchronicity, negotiability, self-explanation, symmetry, and induction bring together the shared, reflective nature that allows individual experiences to build joint understanding (Dillenbourg, 1999). Interdisciplinary team members learn through communication, the ability to speak up, and positive team coordination (Edmondson, 2003). This connection between collaborative learning and psychological safety is apparent, yet research gaps exist in the development of psychological safety in high reliability teams.

Summary

The literature review holds several critical elements as important when working in high reliability teams and when learning in a collaborative environment. Within the literature, attention was given to individual and team behaviors, cohesiveness, communication techniques, and feedback methods. The teams varying bodies consisted of college students, organizations, health professionals, and even wild land firefighters. The existing literature has strength in each of the concentrations. That being said, the intent of this grounded theory study was to bring to light, from the high reliability team members perspective, the typically unspoken psychological safety factors that characterize their collaborative learning efforts. These tacit beliefs create an atmosphere in which team members confront issues and resolve problems. It is through this

collaborative learning orientation that potential barriers are overcome and teams remain highly reliable. Thus, the study helps enhance the understanding of collaborative learning and the development of psychological safety when high reliability team members address intelligence needs. The agency has researched, reviewed, and conducted internal audits to uncover vulnerabilities and foster an effective team environment, so when events challenge analysis, an accurate description evolves. Gaining a clearer understanding of collaborative learning and psychological safety in the world of intelligence analysis contributes to the knowledge base of learning within groups.

CHAPTER 3. METHODOLOGY

Purpose of the Study

The study utilized a grounded theory method of inquiry on integrated work teams that represent a cross section of agency analysts, technology specialists, research professionals, and other work roles. These agency employees work at multiple locations. The study focus is to move beyond descriptions of how team members build psychological safety in a collaborative learning environment and contribute toward generation of a theory on how the process evolves in a somewhat chaotic and ambiguous atmosphere where coordination and interdependent behaviors are required.

The complex nature of collaborative learning requires the flexibility of grounded theory methodology to gather multiple personal perspectives and to analyze the data through an adaptive and layered research process (Corbin & Strauss, 2008). The two principles of grounded theory change and choice guided the research, much like in the lives of those being studied (Corbin & Strauss, 1990). The interactions and social settings are not static, so change and flexibility are incorporated in the study by way of constant comparative analysis and an inductive and abductive methodological approach (Charmaz & Henwood, 2010). The analysis of words into codes, then into patterns and back again is the flexibility and change created when constantly comparing the transcripts and reviewing the recordings in order to find the patterns and relationships.

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The second principle of choice (Corbin & Strauss, 1990) was established through both the participant and researcher s perspectives. The interviews held the actions and reactions of the participants as they described their experiences. From their responses, connections, relationships, and patterns were determined and a theory developed and grounded in the participants words as interpreted by this researcher (Corbin & Strauss, 1990, 2008). This methodological approach, as described by Corbin and Strauss (1990), guided this researcher s conceptualization of the changes and choices made by the participants within their specific work context.

Using a theoretical sampling strategy, this researcher conducted individual interviews from the agency location through face-to-face or speakerphone, when the participant and researcher were not co-located. The interviews were conducted in a secure, confidential room located within the agency facility at a time convenient for the study participants. The interviews were recorded and transcribed. From the transcribed data, the researcher used open coding to identify categories and subcategories to develop labels from the participants own words (Corbin & Strauss, 2008).

From the labels and dimensions, the use of open and axial coding determined the connections and emphasized the causal conditions. The coding labels and dimensions distinguished how and if patterns and relationships emerge (Corbin & Strauss, 2008). Multiple iterations of review and analysis were conducted on each word, combination of words, and sentence to determine best fit, new patterns, different coding, and emerging theory. The categories were developed and refined, through theoretical sampling, sorting, and integrating. The researcher reviewed for gaps and to determine if additional interviews or participants were needed for saturation to be achieved (Charmaz &

Henwood, 2010). From the initial comparing, coding, labeling, and categorizing through the final review, this researcher wrote memos and drew diagrams to illustrate ideas, patterns, questions, and relationships (Corbin & Strauss, 2008). It was appropriate to use the data analysis and theory development supported by grounded theory methodology due to the inductive nature of this study and the current lack of substantive theory on collaborative learning aimed at ensuring psychological safety.

The primary purpose of this grounded theory study was to generate a theory of collaborative learning based on research guided by the question: How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety? For the purpose of this study, collaborative learning is defined as a process that team members use to problem solve where learning occurs through their combined efforts (Gokhale, 1995; Janssen et al., 2010). The study s focus was on collaborative learning in a national security, analytic environment, where integrated teams of experts leverage knowledge and skills to produce solutions to fill intelligence needs (as stated in the agency s report for 2012). In this challenging world, change is constant (Puvathingal & Hantula, 2012). Learning is, therefore, critical to solve emerging problems and conduct predictive analysis (Tetlock & Mellers, 2011).

Research Design

The researcher utilized grounded theory research design to develop an understanding of collaborative learning and psychological safety, specifically on high reliability teams. The structure and analytic processes conducted had flexibility and remained grounded in the participants experiences (Corbin & Strauss, 2008). Interviews were the primary method of data collection. The interpretation of human experiences to

explain exactly how collaborative learning evolves involved more than regurgitating the participant s words. By using the rigorous process approach of grounded theory, this study began with the words of the participants to build a theory through coding, analysis, researcher interpretation, reflexivity, sensitivity, and participant review (Corbin & Strauss, 2008). The process used in this study moved from the microanalysis to the general analysis, and then revolved back and forth through constant comparative analysis. Beginning with the first interview and transcription, the analysis used memoing, multiple forms of coding, and a conditional matrix, along with researcher, participant, and expert review of the data (Corbin & Strauss, 2008).

Grounded theory is based in sociology, with theory discovery emerging from the participants experiences and words (Corbin & Strauss, 1990). The design of this grounded theory study began with defining and framing the research question. The research question was developed from the researcher s desire to understand how high reliability groups learn from errors. More specifically, the focus on high reliability stemmed from the work conducted at the agency. The mission of the agency is broad and encompasses the war fighter, National policymakers, first responders, and the U. S. Intelligence Community (as stated in the agency s report for 2012). When crises occur, the agency response can help save lives (as stated in the agency s report for 2013). Therefore, in an effort to maintain and continuously improve processes, vigilance to learning and the discovery of new knowledge and abilities is a crucial method for success.

The research question of how do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety drove the study

to find an explanation of the process. Grounded theory allows the researcher to explore the depths of situations, experiences, and conditions from the participant s perspective. Symbolic interactionism, an element of grounded theory, strives to uncover the meaning or explanation of the social aspects of life (Jeon, 2004). By collecting the interactions, behaviors, and experiences from the participants, the researcher takes on the role of interpreter and analyst before theory development.

Target Population and Participant Selection

The target population designated in this study is intelligence analysts from the agency, a Department of Defense combat support agency, and a member of the U.S. intelligence community (as stated in the agency s report for 2011). The agency s role is to produce geospatial intelligence (GEOINT; i.e., imagery, intelligence, and data) to support national security. GEOINT derived data provides the context in such a manner that the decision maker can comprehend all facets of the information before initiating a resolution (Doty, 2005). Many intelligence analysts work on teams that consist of professionals from various agency key components who have differing skills and work roles (Fiske, 2012) including but not limited to maritime analyst, spectral imagery scientist, geodetic survey, and counterintelligence officer. Requirements to work at the agency (as stated in the agency s report for 2012) include

- United States citizen;

- Analyst standard requirement is college degree with preference held for those with advanced degrees and competence in specific fields, life experience may be taken into consideration;

- Extremely high personnel security standards required, ensuring employees are highly reliable (Careers in intelligence, 2013) meeting the requirements of integrity and trustworthiness; and

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- Pass an original and have ongoing Personnel Security background investigations, which include educational status, residential history, all previous and current employment verification, and discussions with individuals who are knowledgeable about the individual.

The use of a flexible sample size in the study allowed for sufficient team member participation to answer the research question, inculcate credibility, and be indicative of the available time and resources for the study (Corbin & Strauss, 2008). The sample size was to consist of approximately 8-14 individuals from different teams at the agency. The collection of data was terminated when there was enough participants interviewed to determine saturation and the researcher determined there was sufficient depth to tell the story of the phenomenon (Corbin & Strauss, 2008). Therefore, while the research began with the intent to interview up to 14 participants, in reality saturation occurred at ten participants. There were ten interviews scheduled and conducted to ensure there was sufficient data for concept coverage and no new questions were generated.

The recruitment strategy drew upon the agency larger population of intelligence analysts. The purposive selection occurred because they utilize the principles and techniques of high reliability teams. The high reliability team principles exhibited were

- anticipatory, ripe with alternatives, environment is fast-paced, and actionable (Straus et al., 2011; Weick & Sutcliffe, 2007);

- working or have worked together with a collective purpose; members work in a face-to-face or distributed environment;

- work requires precision engagement to ensure severe harm does not occur; highly trained and committed to the safety of the data (Riley et al., 2010);

- clear processes, designed for quality and monitoring for accuracy and reliability;

- a team and organizational commitment to the detection and analysis of potential inaccuracies;

- an open communication strategy exists when issues occur; and

- team members come from diverse work roles i.e., analytic methodologist, geodetic orbit scientist, maritime analyst, counterintelligence officer, aeronautical intelligence, and spectral image scientist (as stated in the agency s report for 2012).

The intent was for all participants to have experienced interactions or processes, which allowed psychological safety in a collaborative environment to evolve. The researcher used theoretical sampling strategy consistent with the Corbin and Strauss (1990) approach where the focus is on the phenomenon rather than a specific number of individuals.

This research strives to deepen the knowledge base of collaborative learning by using functioning team members that allowed for the capture and synthesis of data from different perspectives. The same lived experiences of individuals may differ in description because the experience comes from their perspective stemming from their background and development (Corbin & Strauss, 1990). This perplexity created very different contributions concerning the same event and helped develop a rich description of the phenomenon, allowing this researcher to define the subtleties of behaviors and emotions.

Procedures

All dissertation research conducted at Capella related to human participants requires plan review and approval by the Institutional Review Board (IRB). The use of agency employees also required agency site, legal, and security offices approval. Once all permissions were finalized, contact was made with agency office directors to explain the research, the estimated time of employee involvement, and the type of data to be

collected. Additionally, a decision packet that included the research plan, Capella IRB approved proposal, and the agency site, legal, and security office approvals accompanied the discussion. After review of packet and further discussions, management concurred with employee participation.

The researcher made initial contact with one specific integrated team suggested through word-of-mouth contact. An introductory email was sent to team members that included agency site, legal, and security office approval, brief description of the study and researcher, informed consent form, and potential time involved. From the original ten emails distributed, four participants responded asking additional questions, with three volunteering to participate. Interview times and dates were established with reminder emails sent one day prior to scheduled interviews. Participants were not assigned to teams for study purposes because their participation was representative of members of functioning work teams. The sampling strategy used was purposeful sampling because the study question required participants with direct personal experience with the phenomenon in question (Corbin & Strauss, 2008).

With the first participant interviews scheduled, the researcher reviewed the team s missions and objectives. This is necessary to ensure a clear grasp on the work the team produces and, if necessary, refine the interview questions. The interview location was at the agency facility. This allowed for the participants convenience and reduced the time required to participate. All interview questions are relative to the workplace; team environment and the responses remained confidential and were transcribed using numeric identifiers. One-on-one interviews consisted of open-ended questions. The interviews were developed to help the participant feel comfortable and free in the ensuing

discussion. The questions helped guide the participant to specific events, allowing them to describe how and what they felt as they relived the moment.

Field tests were conducted to evaluate the interview questions for content validity. Three experts participated. Expert A holds a bachelor s degree in journalism with over 13 years of experience as an editor and works at the agency as an editor. Expert B is a retired army colonel, holds two masters in human resource development and strategic studies, with 15 years as an instructor in graduate studies. Expert C holds a masters in law and diplomacy, works in the strategic intelligence field. None of the experts was included in any request for study participants. Their feedback was similar and recommended the need for a stronger connection to psychological safety from a team environment involving power dynamics. Three questions were incorporated to delve deeper into the dynamics of team processes and relationships.

At the beginning of each interview session, the researcher thanked them for volunteering to participate, explained the study, answered any questions, and reviewed the informed consent form. Once questions were answered and the participant was comfortable, the researcher and participant signed two consent forms. One for the researcher and the participant kept a copy for their records as well. The researcher gave the participant a copy of the questions to review during the session and at the initiation of the first question, the recording device was started. Eye contact, patience, and clarifying questions added to the exploratory nature of the interview. At the completion of each interview, the researcher captured thoughts, impressions, and ideas to clarify. Corbin and Strauss (2008) described this as *memoing*. The memos included observations of the participant s behavior to understand the feelings and context of the described events. The

memos helped with the reflective and analytic processes of coding and theory development.

The transcribed interview recordings were verbatim. Recording the interviews allowed the researcher to focus on the participant totally. The participants reviewed their transcripts for accuracy and intent. All participants concurred with the transcriptions. After the third interview, the researcher determined the participants had limited scope due to their newly developed team. Through word-of-mouth and additional research into current and historical teams, seven more individuals volunteered to participate.

The raw data from the interviews was reviewed and concepts determined through the coding process (Corbin & Strauss, 2008). The researcher determined key terms by using participants own words, in-vivo coding, staying in-line with the participants language by developing descriptive codes during open coding. From the first transcribed interview, the data was divided into manageable chunks to find concepts, categories, and similarities and differences. The interview questions were reviewed and necessary modifications made to incorporate historical team differences where applicable and add participants outside of the original team.

Once the first interviews and transcriptions were completed, the researcher began the coding process. Theoretical sampling guides the researcher through the analytic pathways emerging from the data (Corbin & Strauss, 2008). Moving from interviews, to reflection, to transcriptions, to analysis, and back to reflection and interviews, the circular process breathes energy into the research endeavor.

Open coding broke the interview data into retrievable segments with emerging patterns, concepts, and properties. Using these data segments, the researcher began to

form connections of the participants experiences (Corbin & Strauss, 2008). This deeper level of coding, called axial coding linked the concepts and patterns into categories and subcategories. Though not a sequential process and may even occur at the same time as open coding, it establishes more than participant explanations and descriptions, but to clearer understanding of the questions asked. Using constant comparative analysis, the researcher experienced the emergence of patterns and themes as the coding process continued. The different levels of coding aided the researcher s interpretation of the participant s experiences.

The qualitative data analysis software program, MAXQDA 11® supported the collection, coding, and mapping necessary for grounded theory methodology (Corbin & Strauss, 2008). From the initial round of collection, the interview transcripts were coded and analyzed to create lists of potential categories (Corbin & Strauss, 2008). Through open coding, the researcher reviewed and broke apart each line of transcription searching for concepts and connections to answer the guiding research question. The codes took the form of single words, combinations of words, and sentences (Corbin & Strauss, 2008). The MAXQDA 11® software allowed the researcher to highlight and categorize the codes. The generation of codes began with the participant s own words, which in turn drove the category development.

This data created a visual portrayal of connections, relationships, and interactions between the various codes and memos in MAXQDA 11®. This aided the researcher in understanding how event conditions influenced the interactions of the high reliability team members. The researcher used this visual depiction of the context and circumstances between the team members to develop the concept frame and the emerging

theory (Clarke, 2003). The illustration and concept frame guided the researcher to find links, categories, and subcategories (Corbin & Strauss, 2008).

In this study, saturation was determined when the complexities of the research question became fully developed. The research question being: How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety? Once the researcher determined no additional interviews, new data, concepts, or language was found that each category had been explored and dimensions completed, then saturation within this study s context occurred. After saturation, the researcher reviewed the data again looking at it through the lens of the participants culture and environment that the high reliability team members learn and work. This strategy, combined with the earlier analysis conducted by the researcher, looked for gaps, and finding none, theory development occurred (Corbin & Strauss, 2008).

Instrument

The instruments used for the grounded theory study were in-depth interviews with open-ended questions. This approach allows the participant to use their own words as descriptors and generates rich stories and statements from personal experience (Patton, 2002). At times during the interview, the participants did not answer the questions completely. When this occurred, the researcher asked clarifying, probing, or follow-up questions to help the participant elaborate on their original response. The clarifying, probing, and follow-up questions were not part of the interview protocol below or the interview script.

Research Question and Interview Questions

The primary research question is: How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety?

Interview questions:

1. Think back to when you first joined your team, how were you introduced to the team process of sharing knowledge and expertise?

2. Describe how the work roles on your team are defined.

3. How are differing viewpoints and constructive feedback actively encouraged?

4. When a new project is assigned to your team, describe how the decision is made on what is the best approach to use to reach your goal.

5. If your team needs additional perspective or knowledge, how is that determined and what is done to find and acquire it?

6. If team members do not contribute or are counter-productive in discussions, how does your team incorporate their expertise in the analysis/product?

7. In this unclassified environment, think of a situation when your team members were bringing together data from multiple sources to create one finished product. Describe how your team moved from diverse viewpoints and knowledge sets to a precise and accurate collaboratively developed product.

8. How do members of your team hold one another accountable to fulfill team objectives, such as schedule and quality?

9. Remembering we are in an unclassified environment, think of a time while working on this team when you became aware of an opportunity or problem regarding team processes or functions. What did you do? What was your team s response?

10. Think about a time when a request was received for something your team was inexperienced in producing. How did your team share knowledge?

11. Does your current team experience differ from previous agency team experience? If so, please explain how it is different.

Credibility

Conducting a qualitative analysis within the researcher s workplace can have the implication of interpretive bias, either positive or negative. The credibility of the researcher is an important aspect tightly woven into the framework of the whole research process. While it is impossible to remove all personal bias from a project of this magnitude, all efforts to inhibit personal bias from the results are essential to this researcher. To reflect on the interviews, journal thoughts, feelings, and ideas during data gathering and analysis through memoing were captured and reviewed. The researcher discussed personal background and training relevant to this process, with the participants during the opening interview dialogue. There was also information on the reason for the study, how the arrangements were made to allow access to the teams and participants, and personal or professional connections that could influence the collection, analysis, and interpretation of the information collected discussed during the opening dialogue (Patton, 2002).

Validity and Dependability

Validity and dependability procedures were determined through several separate steps. First, the researcher reflected on the collection, analysis, and theory development process and reviewed how the interactions and relationships were connected. Second, the participants reviewed their transcriptions for accuracy with no changes required. Additionally, an individual employed at the agency, who is an experienced researcher and familiar with data analysis, conducted a review to assess if the connections found and theory developed was accurate. While there were several questions during the discussion, the pathway determined by the researcher was acknowledged as an understandable

approach. The use of differing perspectives, noted above, add to the richness of the study, and increase the credibility and validity to the results.

Steps taken to ensure dependability are

- All interviews were recorded and transcribed with copies of individual transcripts submitted to each participant for review and accuracy of what they said and what they intended to describe.

- The researcher was available for the participants during their data review

- In order to receive honest responses to the research questions, the researcher encouraged openness and informed the participant of the ability not to respond to questions.

- Although the agency was aware of the voluntary nature of participation in the study, the researcher emphasized the participant s anonymity from the transcribed responses and the final report.

- The researcher included in the opening of the interviews, discussion on professional information about the researcher, site permission, and security office approval.

Data Analysis

Corbin and Strauss (1990, 2008) grounded theory methodology guided the data collection and analysis. The analysis was the process used to move the data from the individual perspective to the team perspective and then used by the researcher to generate a theory.

Coding

The researcher reviewed the transcripts in search of information specific to each event, trigger, interaction, assessment, courses of action, and alternative actions. These data points were analyzed for themes, patterns, and concepts (Patton, 2002). The use of open and axial coding in a simultaneous fashion captured distinct aspects of the interviews, and then fused the data together into categories (Corbin & Strauss, 2008).

These categories generated from the participant s actual words created codes for almost every line of transcript in search of emerging concepts and theory (Corbin & Strauss, 2008). During this rigorous process, the researcher wrote analytic memos capturing personal thoughts and inserted into MAXQDA 11®. This began the coding analysis using a grounded theory filter.

The codes are specific and answer questions maintained at the forefront when analyzing the data. The questions were (a) what are they sharing, (b) what are they trying to accomplish, (c) what strategies are they using, and (d) how do they characterize and understand what is happening. The analysis began with open coding using in-vivo coding (using participant s own words). The first stage of transcript review split the transcript into segments, beginning with each sentence, down to each line, and occasionally down to individual words. This deep and very specific look at the participants described experiences familiarized, from the individual s perspective, events.

The researcher used the qualitative data analysis software program, MAXQDA 11® to support the grounded theory methodology. With over ten hours of transcripts, the MAXQDA 11® allowed for organization of the interview transcriptions and the coordination and analysis of coding. The MAXMaps module allowed the design of visual maps of relationships between codes and categories. These abstract maps created category snapshots and linkages between the codes to the main research question, which is how do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety? The researcher used this module to begin theory development of the concept relationships. Capturing all of the study data in one location supported the researcher s analytic capabilities because there was less potential to

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misplace data or miss a code and made it easier to collect the coding into a flexible database. MAXQDA 11® allowed the researcher to use in-vivo coding and develop coding categories, attribute colors to specific codes, and retrieve coded sections of interviews to review the segments together in one screen (Corbin & Strauss, 2008).

During the open coding phase, the second level, axial coding occurred. Looking for relationships and patterns, building on the initial sequence of coding, the researcher conducted a constant comparative analysis. To begin, the synthesized codes were reviewed, organized, and then reorganized into similar or possibly dissimilar categories. Then, using a repetitious process for each transcribed interview, the researcher searched for gaps and prioritized categories. No additional relationships were found and some category dimensions were incorporated. The process of comparative analysis measured response to response, by evaluating side-by-side how the participants described their relationships and the work environments (Corbin & Strauss, 2008).

Next, the creation of selective codes integrated the categories into theory. This phase guided the emergent process of the theory. The coding analysis process used the following steps:

1. Read transcribed data, line by line;

2. Began open coding by dividing data into chunks that make sense, fit together;

3. Assigned codes to the chunks

   - word either pulled directly from the data in-vivo or

   - assigned by the researcher

4. The MAXQDA 11® software maintained a master list of the codes and from what section(s) the code was derived

   - Highlighted codes with different colors

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5. Analyzed another segment of the initial interview or the move to the next transcribed interview. Reapplied codes to phrases, words, or segments of the interview.

6. Discerned inductive concepts from the codes:

   - Summarized and organized the codes

   - Reviewed the data separate from the transcripts, printed out the coding charts from the MAXQDA program

   - Reviewed for word count to determine the frequency that the code appeared throughout the analysis.

7. Reviewed and continued memoing

   - Asked questions about what you have written and why did you want it captured.

8. Developed properties and dimensions, once the codes were organized, then looked at the way they were labeled:

   - what concepts are linked, move together into categories;

   - what are the characteristics of the categories;

   - do the dimensions of the concept fit within the category;

   - is there a better/different way to capture the descriptive code?

9. Evaluated each category to expand what was understood by using deductive analysis to find

   - the cause, event(s),

   - the personal behavior(s),

   - interactions, and

   - consequences.

10. Analyzed, read to understand, and found the core categories by answering questions, such as

   - What answers the research question: How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety?

- What stands out?

- Are there gaps?

11. Took a break from the analysis, refresh.

12. Developed the theory:

- Went back and reviewed the transcripts, the memoing, was anything missed.

- Reviewed the coding process, do the categories link as previously believed.

- Reviewed the dimensions and characteristics, is anything missing.

- Wrote the story of how the theory developed.

13. Contacted expert to review the story and theory, asked for feedback.

14. Incorporated feedback into results.

The practice of abduction is the interpretation of the data to the most accurate determination of an emerged theory (Charmaz & Henwood, 2010). This theory, grounded in the data and compared to literature, leads to the conclusions and recommendations for future research.

Expected Findings

With change constant and the global environment in flux, learning is critical to solve emerging problems and conduct predictive analysis to the extent necessary in the intelligence community (Tetlock & Mellers, 2011; as stated in the agency s report for 2013). The intent of this study was to find the unspoken psychological safety factors that characterize collaborative learning on high reliability teams. The intended theory emerged from the collected data. This theory can assist high reliability teams in the intelligence arena to adapt their team development methods to incorporate the

collaborative learning facets described from this research. This study adds to the

collaborative learning, high reliability, and psychological safety literature.

CHAPTER 4. DATA COLLECTION AND ANALYSIS

Introduction: The Study and the Researcher

Grounded theory research seeks to understand how the underlying conditions influence the study participants to act or respond to the topic under investigation (Corbin & Strauss, 1990). The overall objective of this study was to understand the descriptions made by high reliability team members on how their collaborative learning efforts ensure psychological safety and to develop a theory on the process. This exploration seeks to identify the elements and techniques used within teams of high performance experts who remain focused on the mission, despite interruptions. These experts just happen to work on high reliability teams within an intelligence agency.

It is important to understand the connection of collection and analysis and the data in grounded theory methodology. The use of a grounded theory methodology utilizes a systematic and sequential process that hones all of the gathered information during the discovery mode, allowing the capture of relevant data (Corbin & Strauss, 1990). This study captures all of the concepts described during the interviews. It develops abstract categories with properties and dimensions being determined. With the starting point of words, phrases, and intent taken from the interviews, the integration of comparative analysis, and any other notable environmental conditions created the linkage between collaborative learning and the infrastructure of high reliability teams.

Chapter 4 describes the various components involved in the development of this study. It describes and presents the data, researcher, sample population, methodology, and summary. The researcher included portions of the raw data in order to support the developmental process. Due to the number of coding segments created during the open and axial coding processes, sample sections are included in table formats. A visual depiction is included to illustrate the theory discovery.

The researcher currently works at the agency in the human resource specialist work role. The researcher holds a bachelor s degree in psychology and a minor in organizational leadership from Maryville University, as well as a master s of science in education, with a specialization in training and performance improvement from Capella University. The researcher is pursuing a doctorate in educational psychology.

The role of the researcher is an inquirer, who is aware of biases and works to the completion of an objective study. The researcher was not an advocate for participants, the agency, or any process (Creswell, 2007). The researcher was an employee of the agency; therefore, the potential existed for personal bias to create a positive outcome of this study. While the potential did exist, the experience this researcher developed through work as a mediator and Equal Employment Opportunity (EEO) counselor generated both a personal reflective nature and a strong advisor to discuss concerns. With this experience and knowledge, the researcher remained a neutral component during theory development. Additionally, use of the participants own words to develop the theory reduced the possibility of interpreter bias (Corbin & Strauss, 2008). Using the grounded theory methodology with constant comparison of data enhanced researcher sensitivity to any preconceptions (O Connor et al., 2008).

Except for the recording of interviews and the following transcription, all data collection methods described in this plan was experienced through practical work roles by the researcher. In the work roles of EEO counselor and mediator, the researcher listened to and interviewed numerous employees at all levels within and outside of the agency. This researcher conducted mediations on workplace disputes at several federal agencies. For the mediations to be resolved, this researcher conducted interviews, observations, and intense discussions between all parties, including those represented by legal counsel.

Using the systematic processes of grounded theory and epoché, the researcher bracketed biases and assumptions in the research results. In the beginning, the researcher sought to develop how the development of psychological safety influenced the teamwork of experts on the high reliability teams, yet some trepidation existed that psychological safety might not be present. After discussions with the agency advisor, the researcher was more aware to maintain an open mind, and if psychological safety, as defined, was not found then the results of the research would help the agency recognize this gap and potentially build commitment for a psychologically safe environment.

Description of the Sample

There were 25 individuals invited to participate in the study. From the 25 requests, 10 individuals volunteered to participate. Overall, demographic data was not formally gathered. Through visual observation, while conducting the interviews, the researcher determined two were female and eight were male. All participants worked at the agency west facility with the requisite education and experience background to perform the duties associated with the work of an intelligence analyst.

Research Methodology Applied to the Data Analysis

The data for this study was collected through individual, face-to-face interviews. Potential participants received emails to determine their personal inclination to participate and their availability depending on work schedule. Several did not respond to the original email request. Four responded as willing to participate, but after their original response, made no further contact with the researcher. Eventually, ten individuals volunteered to participate. To allow for the comfort, work schedule, and to maintain anonymity, the interviews were held in a room located on the agency west facility that was obscure enough and easily accessible to the participants. The scheduling of each interview met with the availability of the participants.

The interviews lasted between 45 to 90 minutes. After arrival of the participant, the researcher explained the process, showed the agency site approval letter, and the approval of the agency security office to audio-record the interviews. The interview consent form was reviewed, concurred with, and signed by both the participant and the researcher. The researcher gave each participant a copy of the interview questions at the beginning, for their review during the interview, and retrieved the copy at the conclusion. The interviews remained in accordance with the interview guide. There were additional clarifying questions asked when necessary to gather stronger responses.

Originally, the researcher intended to interview eight participants. Through the interviews and the reflective nature of the process, the researcher determined there was value to have employees who were not part of the original request to participate in the study. The team external perspective added new insight to the theory by integrating differing data points, reaching saturation, and adding dimension to the themes. With the

additional participants, saturation occurred by participant number eight. Two additional participants were scheduled for interviews, which were still conducted, with no new or different information presented.

The researcher conducted the interviews using open-ended questions. The recorded interviews were transcribed verbatim. After the interviews, the researcher wrote memos describing the participant and through reflection, described individual thoughts and feelings. The analysis began after each interview. Through the reflection and analysis of the first interview, inquiry about historical team participation was included in subsequent interviews. The transcriptions were analyzed allowing for codes, patterns, and themes to emerge. This deliberation occurred mindful of the research question. Due to the additional discussions on historical teamwork and saturation level, secondary interviews were not necessary. The results of the collection and analysis are described in the following section.

Presentation of the Data and Results of the Analysis

Corbin and Strauss (1990) described grounded theory as movement-oriented depending on conditions and fluid in response to those conditions. Grounded theory expects flexibility and astuteness to the nuances and details of the life of the participants and the study itself. To that end, the researcher approached the conduction and analysis of the study from the perspective of maintaining adherence to the process guidelines and staying open to change. Following the procedures described gives additional rigor to the study.

Data Analysis and Results

Unlike other qualitative models, in grounded theory methodology, the data analysis begins with the first interview. As the researcher continued the interviews and analysis, relationships began emerging. This step in the process occurs to direct the next steps in the process. The process evolution occurred in this study as well with the researcher including discussion concerning the participant s historical teamwork. Additionally, Question 2 from the originally developed interview guide that addressed work role definition did not prove relevant. The majority of participants focused their responses on the job titles of team members and not the work functions. Some data was retrievable, as it related to other questions responses.

Open Coding Results

Open coding is the foundation of grounded theory, finding relevance between the lines (Corbin & Strauss, 2008). The tediousness of line-by-line review of over 415 minutes of transcripts has the tendency of being overwhelming. Besides the research question, several additional questions helped guide the review, such as, what are they doing, what are they trying to accomplish, and how are they doing this? This helped the researcher remain sensitive to the events and to develop categories from detailed descriptions. The line-by-line coding developed over 300 coding categories. Table 1 shows the categories and the descriptions determined from the participant interviews through the coding process.

Table 1. List of Categories and Descriptions

Categories	Quotes from the interviews describing the categories
Acknowledge skill sets	• I was an unknown, they had to figure out who I was, what skills I brought to the table. • We had the artistic side we had the writing side and then we had my mathematical network analysis side that really we all came together and made this pretty cool graph. • There s certain skills that have to come with that. But then as you got to know the person, and they have skills over here that could, are good, let s let them use those where as another person had a different skill set, we ll let them utilize those. So at the beginning it was like yeah we all have certain skill sets we have to have for our agency work role but as far as the team work role it was more based on your actual skills.
All contribute	• I can t think of any times that people have really been counterproductive or haven t really contributed to be honest. • We don t really have counterproductive we have one person that he complains a lot and he knows he complains a lot and finally its like oh just go on we re not going to come to a win/win situation you have your opinion I have my opinion, lets change the subject.
Build relationships	• Once you establish a relationship and get to know someone, you can kind of figure out when things aren t necessarily clicking exactly the way they want. • Having the directorates work side by side because they really don t know what s going on in our side of the house and we really don t know what s going on over there if you know the other side of the house and back and forth and so this is kind of a like a bridge into the other group you know. Get working relationships and start building those connections. • All based on relationships and getting to know each other getting to trust each other and be ok with being challenged and being wrong, and being ok to admit that. Nobody likes to admit they re wrong, right that stinks. You feel silly, you feel rejected almost, but it s easier that you trust the person that is challenging on it.
Build trust	• Build up that trust to where when something comes down the pipe where even if you know say something utterly ridiculous they have the ability, the comfort to be able to challenge me on that. And say hey why are you thinking that way? • They respect each other as colleagues, as peers, as analysts, and they could work together. So it s really just knowing your people and that takes time of course and just making sure that I m setting an example

Table 1. List of Categories and Descriptions (continued)

Categories	Quotes from the interviews describing the categories
	for them that sets them up for success.
Collaborate	• Generally was very cooperative and productive there was no, there was no dismissing disparate data there was no dismissing different methodologies the folks would talk about it, try to prioritize the importance and then work to some common agreement as to how to put that information together. • They needed it now and so I took three people and I said ok this is the area, we sat down and decided who was going to work what section of the job and we just cut it into thirds and said ok you re going to take the top, I ll take the bottom, and this person got the middle; we all agreed. • We re pretty flexible and collaborative trying to get our end goals accomplished.
Communication	• Being face-to-face really did help a lot. • Direct communication on that it mostly just one lines if I m working the portion of a project we re all together working on I ll just pretty much say ok I ve finished this portion or I m done working on it. • As we got more comfortable, there was a little bit of joking but not necessarily a whole lot.
Different viewpoints	• It s not a personal attack it s more of to improve things. You may still get frustrated but it s not with them for calling it out it s more at yourself for not doing it right the first time. • There s a lot of room there for discussion on how you want this stuff to work.
Direct feedback	• If there were issues, there would be feedback directly to say ok I m not sure this was written well. Usually it was not an issue of analysis but it was in our written products, the style, or are we meeting the guidelines etc. • We joke around and all that kind of stuff so we ve figured out how to tell when someone s trying to be constructive and the other times when they re like wake up on the wrong side of the bed so a lot of its just how you approach it, being fairly non-confrontational about it saying hey, here s what I saw here s how I fixed it you might just look out next time.
Diversity of skill sets	• There s such a wide variety of skill sets on the team so its typically somebody always knows how to do something.

Table 1. List of Categories and Descriptions (continued)

Categories	Quotes from the interviews describing the categories
	• With our three abilities, there s almost no overlap so it s actually very fun to be on that team.
Equal partnership	• Everybody has a voice and say in the fight and we make sure that s communicated out specifically. So you may not be the project manager but you have the ability to disagree and challenge the project manager. • The example of the same end point but how we get there differs how I m working the data, and how my team member is working it differs slightly because of our backgrounds but we recognize that how we get there is going to be different but the end result needs to be the same. So we re not trying to force one into the other s workflow and vice versa, we just recognize the differences but making sure that were not ending up at two different points.
Establish boundaries	• Boundaries are there that they can feel comfortable with and it gives them time, an opportunity to voice that in a safe secure environment. • There s gonna be some tweaks. There s going to be some changes, and we re ok with them. In fact we, we have already talked about that in that hey when tweaks come up, here s what we re going to do. • Make sure they know they have to work together, they are equals, and kind of help them lay out an outline of how they are going to approach the project. Now I won t dictate to them a set way of doing business but just kind of facilitate them in doing that.
Establish individual skill sets	• I have to prove myself or show what I know. • Here s how we re going to work, here s your groups purpose, here s kind of some of the goals we want to accomplish. • Shared our different experiences, different skill sets to one another, and then, we d say hey I didn t know that. Can you show me this?
Familiarity	• If you know, he doesn t like to be pushed into a short turn-around project you may have to work with him. That doesn t mean that he gets a pass on that but understand that that s a hot button issue for him, or a level for discomfort for him, you ve got to work, just get to know each other. • We ve all worked together for so long you re just comfortable with telling it how it is and like if I don t know how to bring something up its like I m not going to beat around the bush its just this is what we re going to do and this is how we re doing it. I guess there s a comfort, kind of like a comfort zone.
Filter personnel	• They ve really filtered the people that have come into this product or

Table 1. List of Categories and Descriptions (continued)

Categories	Quotes from the interviews describing the categories
	this team to kind of want to, the management has wanted this team to succeed. The team leads have wanted this to succeed. • What I did here previously there was just nothing you could do with someone who didn t want to work with you, they re not going to say you only get to work on a piece they look at the team and see again how to best utilize the skills available.
Food	• Bring a little food in, hang out, and again celebrate that crosspollination of knowledge that s going back and forth, positive reinforcement. • Making sure the group goes to lunch occasionally.
Informal peer training	• A person come back from 24/7 and just wanted to refresher, how and what we do, how do I show this, so I just held like a little session and had a white board and we were just drawing different features on the board an I had printed out all the information that we needed and we just sat down and said ok this is how we handle this. • They were very interested in learning how they could apply that and how I might be able to be able to help them do their analysis.
Innovation	• Willingness to go out and try new things, willingness to research and just figure out a way to solve the problem. • People weren t locked into the status quo process and a lot of fresh ideas as well, so we weren t questioning just to question things, we were looking at it trying to figure out how to improve things too and it wasn t always met the most constructively.
Meetings formal	• Formal meeting where everybody kind of exposes what they re working and the troubles that they re having. • Meet every week so that we can discuss any issues and again possibly any changes in priorities; so the team leads will meet every week and then the team leads with our branch chief and my team we will meet once a quarter. • We would sketch that all out first, you know it would be the pre-project meeting, right, before we start everything; so we would nail down the scope, the deadlines we have; would make sure that everybody has the same understanding; but the priority is, how much time we have, who s playing in it, what extra resources we need, everybody would have an understanding of that, and then we would start the project.
Mentor	• I was assigned to one analyst just to follow along and basically see a few days or actually about a week in the life of what he did; so as far as sharing knowledge and expertise he was very good about showing me

Table 1. List of Categories and Descriptions (continued)

Categories	Quotes from the interviews describing the categories
	exactly what he was doing, exactly what he was looking at, why he was looking for that, introducing me to the problem he was trying to solve and also being very good about explaining little details.
	• The communication was really always there but it was guided; as far as being a novice, I needed that instruction to learn my trade and learn my daily job tasks.
Mission First	• You can t lose focus of what you re doing who you re supporting and what your mission is.
	• Sometime personalities get in the way and so I think that s when the chief has to step in an say ok you know lets put this personality stuff aside and focus on our mission and get our work done.
	• Unit cohesion = social + mission, mission is much more highly rated however.
	• Our team has the analytical capability and competency but also it has the emotional capability and competency to ask for help, seek out others and help them in a respectful and professional manner.
Multiple viewpoints	• The real world is that I m going to disagree with what you have to say, and sometimes its going to be 100% of what you say or a percentage otherwise; we have to be able to be comfortable in that disagreement.
	• It was kind of a hands on and lets just get together and share knowledge and everybody was open and receptive.
	• We stop by, just talk about projects, and see how they re going, we ll chat, I ve run across this, how should I approach it? We ll just talk about it basically open door if you have an issue and you can t figure out how to do something you just let someone know or talk about it and try and figure out a solution, it may take a couple laps to find something that will work but we re not going to sit there in our cubes and not talk to each other.
Network	• None of us had experience in it and but I knew there were two people over in the branch adjacent to us that we were doing what we were supposed to or a similar methodology and say hey I ve worked with Eric before and I just said hey, we re doing this and I think this will work can you talk to my people.
	• So basically knowing who to talk to and where to find out the information is how we ve handles where we are inexperienced.
	• Someone on the team may know someone else to go talk to that they think may have a different perspective so we kind of branch out

Table 1. List of Categories and Descriptions (continued)

Categories	Quotes from the interviews describing the categories
	through our own networks to find someone or multiple people that may be able to help with it and like when we ve been on the receiving end of that where someone else will come to us and ask us how to do something so again we know we don t know everything.
Openness to differing opinions	• Everybody just speaks up and gives their view regarding the constructive feedback, some people you got to watch how you give it to them, but everybody s pretty much open and once they stop and think and you give them a good reason why, they ll say ok I see that. • We re interested and very hard on one another as far as joking and you know if one of our team members messes something up we have no problem calling them out on it, and give them a hard time for it.
Peer accountability	• Internal team check. • I m working this area first, and I m working alone and the person over here sees that I ve missed something and they ll say well you need to pick this up you know it s important so then we ll just sort of talk and it s like I m responsible for matching the data and making sure everything ties. • We all want to succeed on what we re doing, we re very motivated at doing it well and so we re all in way we re competing against each other, and competing with each other; you know to make this successful.
Position of weakness	• You have to be able to put yourself in a position of weakness sometimes people respond to that; you know the thing I always tell people is that if you want to make a friend, it seems weird, but ask for help; don t say hey I ll help you. No, ask for help. • It just kind of came to the point where I couldn t move forward any further and I was just, I just basically said you know I m kind of out of options, I don t know. • Each team member stepped up to do that after I couldn t do it anymore. You know I d taken it to where my limitation of knowledge was.
(Be) proactive	• Assessing the situation, seeing what is needed, and then just addressing it. You know addressing it from the front end but making sure you re not causing a problem by too much confrontation. • If I don t know the answer I ll go find out. • Say, hey could you guys review it? Tell me what you think, help me change what I m doing if I need to change course, or you know what

Table 1. List of Categories and Descriptions (continued)

Categories	Quotes from the interviews describing the categories
	should I be looking at differently? And vice versa; we give each other our work to proof, to go over, and to criticize, and since all of us pretty much know each other s skills it pretty openly excepted that he probably has a valid point of what s being said.
Respect	• Respect their opinion and that you know that they re the go to person for this. • Treat each other well and the competency is there. • Common respect. • I was able to go down to the table and say no, we do have this; they can do this. And I would take them along with me to the meetings with group X or group Y and we d start building products from there that were specifically tailored for their subject or their analysis.
Social tools	• We ve been allowed to figure out how to do the sharing; a lot of it was here s some of the tools we have available, whether it be in person via conference, online chat, of coarse email; just figure out how best to communicate. So there were times when meet in person worked especially if everyone was in the same location; VTC when we had to work with people in different locations, and of coarse online with chat and email. • Jabber • They see it floating out there in Jabber occasionally and usually somebody will float a question out there and five or six people will hit on the question, and that s a nice way to interact with it, and so we have an internal Jabber room, then we have sort of a Jabber room for everybody that we work with and so a lot of.
Team positivity	• I tell, them you guys can do this, I have the confidence in you, I think I have more confidence in them then they did where it s like they needed reassurance where it s like hey I am doing this right. • The can t do attitude gets checked at the door because we re not here to just continue on the normal path. Usually if we get a problem, we ll hammer it out till we have something. • It is a definite different mentality; if anything, if you can come up with it, it looks like it s gonna work, we re going to try it.
Time	• It s a long that particular thing is a long-term project, and we have to actively participate in it.

Table 1. List of Categories and Descriptions (continued)

Categories	Quotes from the interviews describing the categories
	• It s all about time. Time. Time. Time. (finger pound).
	• Working together takes time.

Axial Coding

Axial or focused coding is the second level in grounded theory. This stage of the process reviews the codes most frequently used and most relevant, in relation to the research question. Axial coding checks the data relationships as they relate to the categories and subcategories (Corbin & Strauss, 1990). The data that was pulled apart was delicately placed back together in terms of connections and relationships (Walker & Myrick, 2006). During the analysis, the researcher filtered the data and compared it to the previously completed open coding to capture emergent phrases and themes (Corbin & Strauss, 2008). Being mindful of the literature and the research question, the emergent concepts were reviewed using contrast and comparison against the complete data set collected from the interviews.

Five themes emerged during the comparison analysis between axial and open coding process. The five themes are

1. Developing trust,
2. Incorporating expertise,
3. Sharing knowledge,
4. Negotiating differences, and
5. Celebrating successes.

These five themes describe the relationships and define the properties to answer the research question, *How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety?* Table 2 illustrates the relationships between the themes and the open coding examples.

Table 2. Relationships Between Axial and Open Coding

Axial Themes	Open coding
Developing trust	Build trust
	Familiarity
	Food
	Meetings formal
	Multiple views
	Peer accountability
	Position of weakness
	Respect
	Time
Incorporating expertise	All contribute
	Build relationships
	Build trust
	Celebrate
	Communicate
	Establish boundaries
	Familiarity
	Filtered personnel
	Meetings formal
	Multiple views
	Peer accountability
	Respect
	Team personalities
Sharing knowledge	Acknowledge skill sets
	Build relationships
	Build trust
	Celebrate
	Communicate
	Establish boundaries
	Familiarity
	Filtered personnel
	Meetings formal
	Multiple views
	Peer accountability
	Respect
	Team personalities
Negotiating differences	All contribute

Table 2. Relationships Between Axial and Open Coding (continued)

Axial Themes	Open coding
	Build relationships
	Collaborate
	Communicate
	Different viewpoints
	Direct feedback
	Emotional intelligence
	Familiarity
	Innovation
	Meetings format
	Meetings informal
	Mission first
	Multiple views
	Peer accountability
	Proactive
Celebrating successes	Food
	Knowledge crosspollination
	Positive reinforcement

The categories developed from the words the participants used during the interviews. The

interview questions helped guide the participants to describe the process of collaborative

learning aimed at ensuring psychological safety.

Developing trust. The developing trust category (Table 2) was not a surprise

when looking for an understanding of ensuring psychology safety. The third principle of

high reliability organization, sensitivity to operations, develops trust through the

coordination of the complex tasks at meetings (Weick & Sutcliffe, 2007). Several of the

developing trust dimensions described in the current study assist with complex tasks such

as formal meetings, finding and using multiple views, having familiarity of products and

team member s work, peer accountability, and respect.

Participants descriptive quotes in relation to this theme were each team member

stepped up to do that after I couldn t do it anymore. You know I d taken it to where my

limitation of knowledge was.   Another participant stated,   It s easier that you trust the person that is challenging you on something.   A third participant stated,   Have a formal meeting where everybody kind of exposes what they re working and the troubles they are having.   Dillenbourg (1999) descriptions of the four criteria related to situations concern the development and even sustainment of trust. The symmetry of action, knowledge, and status signify how individuals may have the belief that another member is the expert. Yet with common goals and an understanding of how and who will complete the tasks, the dimensions developed in the current study of trust, peer accountability, and being okay with having a position of weakness are interwoven into the collaborative learning elements.

Incorporating expertise. Weick and Sutcliffe (2007) determined an expert was not the most important entity on high reliability teams. Increased level of imagination, high expectations, assertiveness, shared understanding, common goals, and diversity of knowledge and expertise are crucial to collaborative learning (Dillenbourg, 1999) and high reliability teams (Weick & Sutcliffe, 2007). The current study expands these elements with familiarity, multiple viewpoints, peer accountability, and the understanding of team personalities to create the category of incorporating expertise.

Study participants described how the equality of skills and richness of having strength through commonalities created a comfort level that was unanticipated when they joined the team. Several statements elaborated on this important theme such as   feel comfortable with it gives them an opportunity to voice that in a safe, secure environment.   Another participant stated   so we are not trying to force one into the other s workflow and vice versa, we just recognize the differences, but make sure that

where we end up is not at two different points, so when it all comes back together, it works.

Sharing knowledge. The value exhibited by high reliability teams that closely resembles the sharing knowledge category was the commitment to resilience. High reliability teams require depth of knowledge of team members, process and procedures, and the overall mission (Weick & Sutcliffe, 2007). The knowledge element within HRTs is dynamically evolving and diverse with an individual and team perspective. The ability to understand, learn from, and make corrections when the inevitable adversity occurs demonstrates this study s theme of sharing knowledge. In Dillenbourg s (1999) collaborative learning model, the intuitive aspect described collaboration as interactive, thus a collaborative learning atmosphere would be interactive. In this study, the sharing knowledge theme developed around partnerships, individual yet diverse skill sets, knowledge cross-pollination, networking, and social tools. However, sharing did not equate to collaborative learning without reasoning and cognitive processing (Dillenbourg, 1999).

The participants described many examples where the commitment to resilience was valued, collaborative learning was interactive, and sharing knowledge all were interwoven. One participant stated,

> This particular collaboration, it worked really well, bring in a guy that s a great programmer right, because we built this program. While I can do that, but I m not that good at it, so it would ve been very clunky and it would ve taken me a long time. Therefore, instead I prepared all of the data, so I was the data guy, the analyst gave us insight into how this product would best benefit the users, and then I was able to kind of go between what the analyst and the programmer wanted and the data I created. So, I was kind of in between to make it all mesh, so we got what we wanted and the programmer for Google and the analyst got what they wanted so it worked out really great.

Negotiating differences. The theme of negotiating differences was an unexpected development because the participants responses indicated that there were no problems or disagreements between team members. During the coding and analysis phase, what became apparent was that it was not that there were no disagreements or problems, but it was discovered that the team members had learned to negotiate through differences. In the complex field of intelligence analysis, team members remain focused on the mission while in search of answers to the key issues. Weick and Sutcliffe (2007) described this high reliability principle as reluctance to simplify. The analytical teams, as described by study participants, are HRTs that build the capacity to be as knowledgeable as possible by bringing in different viewpoints, voicing concerns, not dismissing disparate data, and being conscious of shared mindsets.

Dillenbourg (1999) also describes collaborative learning as a negotiated process. One individual does not have the ability to impose the direction or team response simply because of status. Collaborative learning emerges from negotiations through guided discussions, talking through challenges, continuously reviewing the process, and as stated by a participant, the openness to learn and the willingness to teach.

Celebrating successes. Celebrating successes theme that emerged during the analysis did not specifically relate to the principles of high reliability teams or collaborative learning. The relationship emerged from the participants expressions of how familiarity and trust was developed. Participants statements were, bring a little food in, hang out, and again celebrate that cross-pollination of knowledge that s going back and forth to achieve the positive reinforcement. Another participant stated,

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Somebody takes a step outside their comfort zone and brings in more knowledge; they haven t lost anything of baking cakes, they ve just added making pies. That s a great thing. We ve just established more knowledge then what we initially had- that s a good thing. I think the worst thing we could do is say, this pie isn t up to snuff.

Selective Coding

Going back to the research question: *How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety*? refocused the researcher for the last stage of the analysis process. The selective coding process required the selection of the core categories; the central tenet(s) that represent the phenomenon the study was designed to determine (Corbin & Strauss, 1990). During this phase of analysis, numerous drafts were developed using Microsoft Word, Excel, and PowerPoint. The visual portrayal helped the researcher remain open and questioning about the relationships between categories and the linkages to the research question. The selective coding stage is one of telling the story of the theory emergence, one where the use of diagrams, questioning, and reflection helped to build an abstract model (Corbin & Strauss, 2008). Even though the model is abstract, the links between categories and subcategories and then into the final emergence must be strong (Corbin & Strauss, 1990).

Once the theory emerged, the researcher contacted the participants who agreed to review the conceptualized theory. The researcher and participant reviewers began by briefly reviewing the purpose of the study. The researcher explained the data collection, coding, and the analysis processes, and was available to answer questions. The participant reviewers were comfortable with the results, understood the connections, and felt the quotes were applicable to the categories. An additional comment was that of being pleasantly surprised at the results.

During the research process, several matters occurred that had the potential to influence the study. First, this study was conducted when many potential participants were busy supporting the mission of the agency and they were, therefore, unable to participate. Second, the researcher was granted a short window of time to complete the interviews, and due to scheduling difficulties, was unable to complete all of the interviews. Fortunately, the site executive granted an extension, allowing all interviews to be completed during the time extension. Additionally, the researcher s agency advisor retired four months before the completion of the study. Two individuals stepped in and supported the researcher for the remainder of the study.

Before discussing the emergent theory, some discussion must point out the absent connection between the study results and the collaborative knowledge building (CKB) model. While the model designed by Stahl (200) and subsequently adapted by Singh et al., (2007) is effective, the tools of reflective thinking and collaborative reflective discourse were determined to not have influence on the collaborative learning process as they relate to this grounded theory study. Included in Chapter 5 is further discussion on another topic previously discussed, the zone of proximal development (ZPD), and the linkage to the study results.

Emergent Theory

Through coding, constant comparative analysis, and reflection, five themes emerged as the logical conclusion to the research question. The five themes emerged from the larger group of over 200 code segments generated from the interviews. The theory is grounded in the data and answerable to the research question: How do high

reliability team members describe the process of collaborative learning aimed at ensuring psychological safety?

With the coding completed, the researcher conducted an in-depth review in search of patterns and constructs. The methodological process was now at the stage where the search for an answer to the research question should occur. This phase circled back to the transcripts and the recorded interviews. Listen to the participants, hear what they said, re-read the memos, and locate the connections. It was apparent that the participants did not argue or give up on presenting their point of view or new ideas. A confirming comment, when I showed them my conclusions they were like yeah, that s correct, so I basically confirmed what they had with no questions. This mindset was typical throughout the responses. Additionally, the participants spoke about the concept instilled on inexperienced analysts to question mentors and experts. This piece became a focal point to the emerging theory.

Within these teams, psychological safety began during the incubation period and then was woven throughout the entire team process without team members talking about it. Collaborative learning does not develop because two people work together. There was interaction or activities that trigger the learning environment. It remains for the individual or team to learn. This learning process is paramount for a high reliability team s success. High reliability teams value information exchange that is not simply a regurgitation of what is evident but a clear and accurate exchange that is persuasive and open to feedback as suggestions or if necessary, corrective (Weick & Sutcliffe, 2007).

Psychological safety was evident when the discussions turned to the products and analysis. One analyst does not work from beginning to end alone on analysis. To meet

customer requirements and depending on the priority level, several analysts through the

team approach must work together, find the best resource, determine accurate and concise

data, all in order to meet the needs of the customer. One participant stated it clearly as,

> If we were all given the same job, there were six of us, it would be done six
> different ways, but we d all get to the same end product. And the end product is
> what does the customer want and basically, as long as we ve got those
> requirements so we know up front where they re going, or where our end goal is,
> no matter what our differences are, this is what they ve asked for and this is what
> we need to provide.

Throughout the interviews, the focus was mission first. Team members knew that

personalities were not the most important piece of teamwork. The correct and accurate

analysis ensuring safety of the product was an absolute. Everything was reviewed and as

described by a participant, we regularly communicate, we try to figure out a fix for it if

there is one, and talk about it and try if that doesn t work, we ll try something else.

The team members met, agreed upon the work that needed to be completed,

discussed expectations, and negotiated roles based on their knowledge of each other s

skills. This collaborative learning method stems from the planned performance approach

exhibited by high reliability teams through the reluctance to simplify value identified by

Weick and Sutcliffe (2001).

From the codes, patterns and relationships a theme emerged as vital throughout all

aspects. The catalyst of negotiating differences had dimensions throughout the

interviews. The beginning of the analysis process concerned agreement and learning from

those experts. This valid theme of sharing knowledge and incorporating expertise also

incorporates the negotiating differences aspect that must occur for knowledge cross-

pollination and equal partnerships to evolve.

The five core themes that emerged during the analysis were

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1. Develop trust

2. Incorporate expertise

3. Share knowledge

4. Negotiate differences

5. Celebrate successes

Summary

Using a theoretical sampling strategy, this researcher conducted individual interviews at the agency in a secure, confidential room. The interviews were recorded and transcribed. Using an emergent design methodology, multiple levels of coding were conducted and identified categories and subcategories from the participants words (Corbin & Strauss, 2008). Through subsequent analysis and reflection, the study found intersections between Dillenbourg s (1999) collaborative learning methodology, the Weick and Sutcliffe (2007) high reliability principles, and the study results.

Looking back again at the research question of *How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety* and the results of the study, a theory emerged. The high reliability team environment thrives around the five catalysts determined during this study, which influence collaborative learning while ensuring psychological safety. Those five catalysts are (a) sharing knowledge, (b) negotiating differences, (c) incorporating expertise, (d) developing trust, and (e) celebrating successes. The participants described in elaborate details the processes and reasoning behind the efforts used to finish the team analysis, services, and products. From the details described by the participants, dimensions for each catalyst were developed and are illustrated in Table 3.

Table 3. A Snapshot of the Five Catalysts and Subsequent Dimensions

Sharing Knowledge	Negotiating Differences	Incorporating Expertise	Developing Trust	Celebrating Successes
Be proactive	All contribute, Participate, be in the moment	All contribute, Participate, be in the moment	Familiarity, respect	Knowledge cross-pollination
Build relationships, team positivity	Be proactive	Build relationships	Meet formally	Positive reinforcement
Collaborate, use social tools	Build relationships	Build trust	Multiple viewpoints	Celebrate through food
Equal partnerships	Collaborate	Celebrate	Peer accountability	
Familiarity, respect	Communicate	Communicate	Allow yourself to be seen in a position of weakness	
Filter personnel	Prioritize requirements	Establish boundaries	Through food	
Informal peer training	Direct feedback, use emotional intelligence	Familiarity, respect	Time, time, time	
Innovation	Familiarity, respect	Filter personnel		
Manage skill sets: acknowledge other s skills, find additional when needed, cross-pollinate knowledge, and bring in diverse skill sets	Innovation	Meet - formally		
Meet formally and informally	Meet formally and informally	Multiple viewpoints		
Mentor and Network	Mission First	Peer accountability		
Mission First	Multiple viewpoints	Understanding team members personalities		
Peer accountability	Peer accountability			

Throughout the interviews, and also captured in the dimensions, was the overarching thread of mission first. During the interviews when the participant discussed the efforts made to bring in different views and the development of their analysis or

product, there was strength of presence in their demeanor. This strength links to the definition of high reliability teams, defined in Chapter 1, as a work environment where the stakes are undeniably high, have less than their fair share of errors, and recognize the necessity to channel human flexibility to avert errors (Reason, 2000; Weick & Sutcliffe, 2007). Chapter 5 elaborates on the study results, the relationship with the literature, and a more in-depth explanation of the resulting theory.

CHAPTER 5. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

Alone we can do so little; together we can do so much. – Helen Keller

The purpose of this chapter is to summarize the study and the results, reflect on the process, and discuss recommendations for future efforts. The discussion section also provides the study, design limitations, and links the study results with the previous literature. The research question that began this whole dissertation process is *How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety.* This grounded theory study determined five catalysts that support the collaborative learning environment. None of the catalysts pertained to equipment, rewards, or physical environment. Although psychological safety was evident through the interview responses, it was not determined to be the most necessary variable to ensure high reliability team success.

At the beginning of the research process, the intent was to move beyond descriptions of how to build psychological safety in a collaborative learning environment. The objective was to contribute a theory that illustrates how, in a somewhat chaotic atmosphere where coordination and interdependent behaviors are required, does collaborative learning ensure psychological safety. Collaborative learning is a combined effort in which learning occurs through negotiated relationships (Bruffee, 1995; Gokhale, 1995; Dillenbourg, 1999; Janssen et al., 2010). The conclusion of this study generated a

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theory portrayed by five catalysts at the core and defined by dimensions and characteristics for greater definition.

Summary of the Results

The key topic in this study was collaborative learning. Underlying the key topic was the environment in which the team members learn. This environment was an intelligence agency. The participants were analysts working on high reliability teams at the agency. The research question was *How do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety.* The study s significance is the contribution to the ongoing efforts to improve intelligence analysis by building on the current levels of trust and collaboration required for successful analyst-to-analyst interaction and information sharing (Immerman, 2011; Puvathingal & Hantula, 2012).

Discussion of the Results

A pivotal moment occurred during data analysis of this grounded theory study. Early in the interviews many of the participants when asked about differing viewpoints, described an environment where everyone agreed on analysis results. With comments such as I can t think of a time when that wasn t completely accepted as ok go for it, and I don t really recall any instances of really negative feedback at all to be honest, and There really was no issue about conflicts and analysis, folks did their jobs, shared their results. The participants, all team members of different teams within the agency, were then asked about counter-productivity and accountability. The descriptions were somewhat different from the earlier question. Now they described how on occasion issues

had to be resolved and through direct, constructive feedback discuss the concerns about

an analysis or a product. Comments include,

> Going to talk to this person you know [and say] hey is everything going ok,
> giving them a chance to vent or [you] voice your opinion again not saying, you
> will do this, that stuff doesn t work   it s very subtle then there s no reason not to
> come and just let them work it out themselves if you have a few minutes. So
> getting as much information as possible to know that the conflict seems to be right
> here ok and it s no one s fault. It s just that these two don t see eye to eye on
> certain things.

And from another participant,

> Everybody just speaks up and gives their view regarding the constructive
> feedback, some people you got to watch how you give it to them but everybody s
> pretty much open and once they stop and think you give them a good reason why,
> they ll say ok I see that.

Corbin and Strauss (2008) described the theory development process as

developing, verifying, and finding the emerging concepts and theory. To that point, the

researcher talked again with a couple of the participants, who were willing to give

feedback on the data interpretations. At first, there was surprise that the concept of

negotiating differences was so pronounced in the responses. Just as described, earlier

from a participant described the response after giving feedback concerning a product

revision, Once they stop, and think, you give them a good reason why, they ll say ok I

see that. The negotiating differences catalyst made sense and was relative to the mission

first mentality held by the participants.

Another important concept woven throughout the interviews was incorporating

expertise by acknowledging individual skill levels. Vygotsky acknowledged this tenet in

the zone of proximal development (ZPD) theory. Learning is a social process and the

interactions have the potential to support personal growth and development (Doolittle,

1997). The ZPD as defined by Vygotsky (1978) was in an academic environment and through teacher and learner interaction move past the knowledge gap by determining the current level of knowledge and the level of knowledge that can be attained with support either formally or informally (Doolittle, 1997). The instruction, by a more capable peer, assists the individual to move into the mastery level on some tasks. Within the study, connection to the teacher and student dynamic as described occurred when peers worked on a joint project. One peer has experience and knowledge on the processes involved to complete a project. This zone was evident during a participant s description of an effort made when developing a product.

> We brought in a guy that s a great programmer right, because we built this program. While I can do that, but I m not that good at it so it would ve been real clunky and it would ve taken me a long time.

The essence of the zone in this team was the social system created by peers, experts and novices, and supported by management thus creating a positive interdependence of team members and their respective networks.

This positive interdependence, described by the participants, created a stage of learning in a team environment with the expectation to question, critical thought was valued, and equal partnerships were acknowledged. Collaborative learning in this setting, where the agency is a Department of Defense combat support agency and a member of the U.S. intelligence community (as stated in the agency s report for 2011), is critical to mission success. The ability to practice the tradecraft and question the experts added energy and commitment, which was expressed by the participants. Literature describes collaborative learning as encouraging risk-taking, questioning, and the use of social interactions to develop knowledge (Bruffee, 1995).

The primary research question how do high reliability team members describe the process of collaborative learning aimed at ensuring psychological safety was answered by the participants without acknowledgement of the key topics addressed within the question. The participants perspectives on collaborative learning and psychological safety did not direct responses. The focus instead was on sharing knowledge, meeting the objectives, and satisfying customer requirements.

The five catalysts sharing knowledge, negotiating differences, incorporating expertise, building trust, and celebrating successes show strong connections to Dillenbourg s (1999) collaborative learning methodology and the five values exhibited by high reliability teams (Wilson et al., 2005). This portrayal is illustrated in Table 4. The catalysts determined through this study, are different mechanisms that exist within the study s high reliability team environments. When the mechanisms are used during task activities, they can trigger learning.

Looking at collaborative learning from a holistic perspective a complex system emerges. Team members meet and organize; communicate, question, and reflect; change, challenge, negotiate, and innovate to accomplish the final product. This environment requires member s confidence and the determination to do more and do it better. The five catalysts that emerged from the study significantly correlate to high reliability team values that demonstrate safety in organizations (Wilson et al., 2005). The high reliability team values are sensitivity to operations, commitment to resilience, deference to expertise, reluctance to simplify, and preoccupation with failure. These values have several team level behaviors that signify mindful determination for an error free environment.

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Table 4. Intersections Between the Values Exhibited by High Reliability Teams, Collaborative Learning Criteria, and the Current Study Catalysts and Dimensions

Values exhibited by High Reliability Teams	Collaborative Learning Criteria	Current Study Catalysts	Current Study Dimensions
Sensitivity to operations- *Closed loop communication*	Situation, Interactions Processes, Effects	Sharing Knowledge Negotiating Differences	Communicate Acknowledge skill sets Different viewpoints
Sensitivity to operations- *Information exchange*	Situation, Interactions Processes	Negotiating Differences Incorporating Expertise Celebrating Successes	Meet-formally & informally Knowledge cross-pollination Familiarity Informal peer training Network
Sensitivity to operations- *Shared situation awareness*	Situation, Interactions Processes, Effects	Negotiating Differences Incorporating Expertise Developing Trust	Familiarity Equal partnerships Collaborate
Commitment to resilience- *Back-up behavior*	Situation, Interactions Processes, Effects	Incorporating Expertise Developing Trust Celebrating Successes	Participate-be in the moment Build trust Knowledge cross-pollination Acknowledge skill sets
Commitment to resilience- *Performance monitoring*	Situation, Interactions Processes	Sharing Knowledge Incorporating Expertise Developing Trust	Peer accountability Equal partnerships Team personalities Direct feedback
Commitment to resilience- *Shared mental models*	Situation, Interactions Processes	Incorporating Expertise Developing Trust	Be proactive All contribute Collaborate
Deference to expertise- *Assertiveness*	Situation, Interactions Processes	Sharing Knowledge Negotiating Differences	Build relationships Direct feedback Knowledge cross-pollination
Deference to expertise- *Collective orientation*	Situation, Interactions Processes	Negotiating Differences Incorporating Expertise Developing Trust	Acknowledge skill sets Respect Build relationships Knowledge cross-pollination Diversity of skill sets
Deference to expertise- *Expertise*	Situation, Interactions Processes	Sharing Knowledge Negotiating Differences Incorporating Expertise Developing Trust	Mentor Establish boundaries Equal partnerships Acknowledge skill sets
Reluctance to simplify- *Adaptability/flexibility*	Situation, Interactions Processes	Sharing Knowledge Incorporating Expertise Developing Trust	Establish boundaries Equal partnerships Diversity of skill sets
Reluctance to	Situation, Interactions	Negotiating Differences	Filter personnel

Table 4. Intersections Between the Values Exhibited by High Reliability
Teams, Collaborative Learning Criteria, and the Current Study Catalysts (continued)
and Dimensions

Values exhibited by High Reliability Teams	Collaborative Learning Criteria	Current Study Catalysts	Current Study Dimensions
simplify- *Planning*	Processes, Effects	Incorporating Expertise Celebrating Successes	Meet-formally & informally All contribute
Preoccupation with failure- *Error management*	Situation, Interactions Processes, Effects	Sharing Knowledge Negotiating Differences Celebrating Successes	Team personalities Positive reinforcements Build relationships Peer accountability
Preoccupation with failure- *Feedback*	Situation, Interactions Processes, Effects	Sharing Knowledge Negotiating Differences Celebrating Successes	Direct feedback Equal partnerships Positive reinforcement
Preoccupation with failure *Team self-correction*	Situation, Interactions Processes, Effects	Incorporate Expertise	Respect Built trust

Table 4 illustrates the intersections between the five catalysts and 23 dimensions
revealed in this study, the collaborative learning criteria, and the high reliability team
values. Literature has not made a connection between high reliability teams and
collaborative learning ensuring psychological safety. The results of this study indicate
that a connection does exist between high reliability teams and collaborative learning
through the five catalysts and 23 dimensions. The catalysts and dimensions delineated in
Table 4 are examples of how high reliability team members exhibit their values. To
ensure psychological safety, the collaborative learning criteria were used as the
mechanisms to connect the catalysts and dimensions to the high reliability team values.
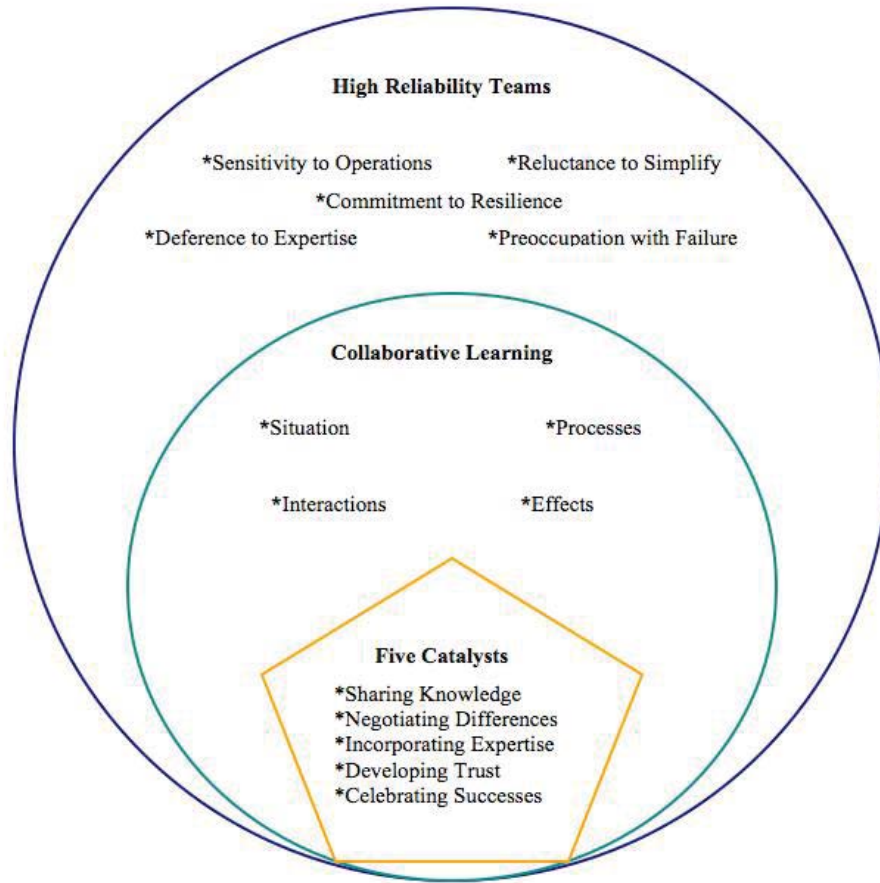
Figure 1. Risk-free collaborative learning model for high reliability teams.

To answer the research question of *How do high reliability team members describe collaborative learning aimed at ensuring psychological safety*, high reliability team members develop the capacity to negotiate differences starting at formation and woven throughout the team process. Additionally, in support of Swartz and Triscari (2011) study results, the current study catalyst dimensions that are diversity of skills and points of view, flexibility, respect, open communication, direct feedback, and trust built over time are linked to high reliability team values. The model that emerged from the data (Figure 1) captures the catalysts as the heart of the collaborative learning process used within these high reliability teams.

Discussion of the Conclusions

The literature reviewed for and during this study looked at the topics as independent matters. The researcher found, during the course of this study, that the topics are interrelated. In the environment in which this study was conducted, a team completes the tasks at hand using the principles of high reliability teams, collaborative learning techniques, and the catalysts and behaviors described in the model. The qualitative data generated during this study was necessary to build an understanding of how high reliability teams continuously update and deepen their knowledge and expertise, manage and resolve problems, and succeed when the unexpected occurs.

Edmondson and Singer (2011) studied cardiac surgery departments. Their study determined that successful surgical team leaders conveyed an interdependent communication style, acknowledged their fallibilities and need for others, and created a learning-oriented atmosphere. Team members on these surgical teams were comfortable voicing their concerns in the operating room and in the reflective sessions held after the surgical events. Additionally, the team members were carefully selected to participate. The results of the Edmondson and Singer (2011) study closely resemble the results of the current study. Filtering personnel, allowing oneself to be seen in a position of weakness, and the equality of the team members are acknowledged as dimensions within the model.

This study found the catalyst of negotiating differences as a distinguishing catalyst. Similarly, research conducted by Swartz and Triscari (2011, p. 334), describe that in the process of forming collaborative relationship, a primary task is the negotiation of habits of mind. The collaborative learning environment moves away from the individual and any boundaries created by the individual. The results of this

study move forward the understanding of collaborative learning in high reliability teams. Specifically, this research (a) describes the five catalysts and the 23 dimensions that underpin collaborative learning in high reliability teams, (b) illustrates the connections between collaborative learning and high reliability, and (c) highlight the significance of psychological safety to support the collaborative learning environment required within high reliability teams.

Limitations

From the beginning of the study, the main limitation anticipated was the setting where the research occurred. The research was conducted at the agency, which is a member of the U.S. intelligence community and a Department of Defense Combat Support Agency. The limitation was valid yet was mitigated by the researcher by

1. Completing all of the requisite work and follow-up with the agency security officers, legal counsel, and site coordination representatives;

2. Focusing the research on team work and team member relationships; and

3. Ensuring that all communication was maintained at the Unclassified level.

Additional limitations that developed over the course of the study were time constraints, sample size, and all participants being located at one facility. These limitations influence the generalizability of the study (Patton, 2002).

The limitations on time concerned the length of access granted to conduct research at the agency. The availability of the participants for the interviews had to be completed around their work schedule. While originally there were some complications meeting the participants schedule and the length of access, a request for some additional time was granted. The additional time allowed the researcher to complete all of the

interviews needed for the study. An additional implication of time constraints was the ability to interview team members of the participants who work in different locations. All participants worked at the location where the interviews were conducted.

The researcher assumed that a sample size of ten participants would be easy to solicit and acquire; however, after three weeks and only three participant interviews scheduled, additional efforts were made. Through networking and inquiries with the current participants, an additional seven participants agreed to participate in the study. Once the necessary qualifications were established, ten participants completed the sample. Although the sample size was small, the data collected was rich in detail and the information collected met the theoretical level of saturation (Corbin & Strauss, 2008).

Recommendations for Future Research

The development of five catalysts that exist in the collaborative learning environments of high reliability teams requires further delineation. Future research should be conducted to examine how the catalysts, defined in this study, develop. Additionally, research to include demographic data including historical information could be helpful when looking to understand why these catalysts emerge. With the agency being a Department of Defense agency and without demographic knowledge of the current study participants, does a military background assist with catalyst development?

Future researchers may conduct the same study using participants on teams that are not co-located, including deployed personnel, take the study to other intelligence agencies, and even use interagency teams. They could also look at teams within an intelligence agency that do not participate in the actual product development or analysis such as, human resources and financial management. Other possibilities include conduct

the study using a larger sample size and include fieldwork that is, to observe the teams in action. Use a mixed method approach and along with the interviews conduct a team behavior survey. Either develop one or find a team behaviors survey related to high performance.

To enhance generalizability, high reliability teams could be studied in other industries such as, wild land firefighters, healthcare surgical teams, and aircraft carrier flight deck teams.

Conclusion

One of the reasons this study was designed and conducted was to address the gap in the literature on collaborative learning in high reliability teams. While the literature has explored high reliability teams and collaborative learning separately, this study brought into the focus a deeper understanding of how collaborative learning and psychological safety influence team work in high reliability teams. This grounded theory study provided an understanding of how collaborative learning occurs in these high reliability teams.

This study identified five catalysts and numerous attributes by listening to the participants describe their work environment and experiences. Using the participants words to develop the coding, categories, and subcategories reduced the researcher bias and allowed the theory to represent the actual team members accounts of events. In fact, the participants talked positively about team members and felt that counter-productivity and lack of agreement were not part of their team environment or culture. Yet, when the researcher analyzed the interviews and created the categories, which developed into the five catalysts, the second heaviest category was negotiating differences. It was evident from the discussions that the participants did not believe there were negative facets of

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teamwork. The study suggests that perhaps the reason for this feeling is that negotiability has become part of the culture within these high reliability teams just like sharing knowledge and developing trust. In fact, negotiability is one of the dimensions Dillenbourg (1999) developed for collaborative learning.

The connections between high reliability teams and collaborative learning are seamlessly woven into their culture. The study indicates that the five catalysts are ingrained into the team culture. Furthermore, as this study suggests psychological safety, as defined by Edmondson (2004b) and Kahn (1990) is a group norm and there is a shared conviction that it is safe to question the status quo, take risks, and disagree without condemnation, reprisal, or lose of status. Psychological safety s importance was not lessened by the lack of participant s direct statements calling out psychological safety. In fact, this principle is palpable without the participants even mentioning the words.

REFERENCES

Baker, D. P., Day, R., & Salas, E. (2006). Teamwork as an essential component of high-reliability organizations. *Health Research and Educational Trust, 41*(4), 1576-1598. doi:10.1111/j.1475-6773-2006.00566.x

Barkley, E. F., Cross, K. P., & Major, C. H. (2005). *Collaborative learning techniques: A handbook for college faculty*. San Francisco, CA: Wiley.

Boin, A., & Schulman, P. (2008). Assessing NASA s safety culture: The limits and possibilities of high-reliability theory. *Public Administration Review, 68*(6), 1050-1062.

Bruffee, K. A. (1995). Sharing our toys: Cooperative learning versus collaborative learning. *Change, 27*(1), 12-18.

Cannon, M. D., & Edmondson, A. C. (2001). Confronting failure: antecedents and consequences of shared beliefs about failure in organizational work groups. *Journal of Organizational Behavior, 22*, 181-177.

Cannon, M. D., & Edmondson, A. C. (2005). Failing to learn and learning to fail (intelligently): How great organizations put failure to work to innovate and improve. *Long Range Planning, 38*, 299-319,

Careers in intelligence. (2013). Retrieved January 28, 2013, from http://intelligence.gov/careers-in-intelligence/background-clearance.html

Carmeli, A. (2007). Social capital, psychological safety and learning behaviors from failure in organizations. *Long Range Planning, 40*, 30-44.

Carmeli, A., & Gittell, J. H. (2009). High-quality relationships, psychological safety, and learning from failures in work organizations. *Journal of Organizational Behavior, 30*, 709-729. doi:10.1002/job.565

Chaiklin, S. (2003). The zone of proximal development in Vygotsky s analysis of learning and instruction. In A. Kozulin, B. Gindis, V. S. Ageyev, & S. M. Miller (Eds.), *Vygotsky's educational theory in cultural context* (pp. 39-64). Cambridge, UK: Cambridge University Press.

Charmaz, C. (2006). *Constructing grounded theory: A practical guide through qualitative analysis.* Thousand Oaks, CA: Sage.

Charmaz, K., & Henwood, K. (2010). Grounded theory. In C. Willig & W. Stainton-Rogers (Eds.), *The SAGE handbook of qualitative research in psychology* (pp. 240-261). London, England: SAGE.

Clarke, A. E. (2003). Situational analyses: Grounded theory mapping after the postmodern turn. *Symbolic Interaction, 26*(4), 553-576.

Cooke, N. J., Gorman, J. C., Duran, J. L., & Taylor, A. R. (2007). Team cognition in experienced command-and-control teams. *Journal of Experimental Psychology: Applied, 13*(3), 146-157. doi:10.1037/1076-898X.13.3.146

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology, 13*(1), 3-21.

Corbin, J. M., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing group theory.* Thousand Oaks, CA: Sage.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice, 39*(3), 124-130. doi:0040-5841/2000

Detert, J. R., & Edmondson, A. C. (2011). Implicit voice theories: Taken-for-granter rules of self-censorship at work. *Academy of Management Journal, 54*(3), 461-488.

Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed), *Collaborative-learning: Cognitive and computational approaches* (pp. 1-19). Oxford, England: Elsevier.

Doolittle, P. E. (1997). Vygotsky s Zone of Proximal Development as a theoretical foundation for cooperative learning. *Journal on Excellence in College Teaching, 8*(1), 83-103.

Doty, J. M. (2005). Geospatial intelligence: An emerging discipline in National Intelligence with an important security assistance role. *The DISAM Journal,* 1-14.

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350-383. doi:10.2307/2666999

Edmondson, A. C. (2003). Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies, 40*(6)*, 1419-1452. doi:10.1111/1467-6486.00386

Edmondson, A. C. (2004a). Learning from mistakes is easier said than done: Group and organizational influences on the detection and correction of human error. *The Journal of Applied Behavior Science, 40*(1), 66-90. doi:10.1177/0021886304263849

Edmondson, A. C. (2004b). Psychological safety, trust, and learning in organizations: A group-level lens. In R. M. Kramer, K. S. Cook (Eds.), *Trust and distrust in organizations: Dilemmas and approaches* (pp. 239-272). New York, NY: Russell Sage Foundation.

Edmondson, A. C., & Singer, S. J. (2011). Confronting the tension between learning and performance. *Reflections, 11*(4). 34-43.

Flin, R., O Connor, P., & Mearns, K. (2002). Crew resource management: Improving team work in high reliability industries. *Team Performance Management, 8*(3/4), 68-78. doi:10.1108/13527590210433366

Fiske, S. (2012). Integrated work groups drive improvements to analytic process. *Pathfinder, 10*(5), 18-20.

Gielen, S., Peeters, E., Dochy, F., Onghena, P., & Struyven, K. (2010). Improving the effectiveness of peer feedback for learning. *Learning and Instruction, 20*, 304-315. doi:10.1016/j.learninstruc.2009.08.007

Gokhale, A. A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education, 7*(1), 22-30.

Hackman, J. R. (2011). *Collaborative intelligence: Using teams to solve hard problems.* San Francisco, CA: Berrett-Koehler.

Hackman, J. R., & O Connor, M. (2004). *What makes for a great analytic team? Individual vs. team approaches to intelligence analysis.* Washington, DC: Office of the Director of Central Intelligence, Intelligence Science Board.

Heuer, R. J. (2006). *Psychology of Intelligence Analysis.* New York, NY: Nova Science.

Hoy, A. W. (2002). Educational Psychology. In James W. Guthrie (Ed.), *Encyclopedia of Education, Gale Virtual Reference Library*, (2nd ed., Vol. 2, pp. 676-683). New York, NY: Macmillan Reference. Available from http://www.cengage.com

Immerman, R. H. (2011). Transforming analysis: The intelligence community s best kept secret. *Intelligence and National Security, 26*(2-3), 159-181. doi:10.1080/026845 27.2011.559138

Janis, I. L. (1982). *Groupthink.* Boston, MA: Houghton Mifflin.

Janssen, J., Kirschner, F., Erkens, G., Kirschner, P. A., & Paas, F. (2010). Making the black box of collaborative learning transparent: Combining process-oriented and cognitive load approaches. *Educational Psychology Review, 22*, 139-154. doi:10.1 07/s10648-010-9131-x

Jeon, Y. H. (2004). The application of grounded theory and symbolic interactionism. *Scandinavian Journal of Caring Sciences*, *18*(3), 249-256.

Johnston, R. (2005). *Analytic culture in the US Intelligence Community: An ethnographic study.* Washington, DC: The Center for the Study of Intelligence, Central Intelligence Agency.

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal, 33*(4), 692-724.

Kayes, D. C. (2002). Proximal team learning: Lessons from United flight 93 on 9/11. *Organizational Dynamics, 32*(1), 80-92.

Kayes, A. B., Kayes, D. C., & Kolb, D. A. (2005). Experiential learning in teams. *Simulation & Gaming, 36*(3), 330-354.

Knapp, R. (2010). Collective (team) learning process models: A conceptual review. *Human Resource Development Review, 9*(3), 285-299. doi:10.1177/15344843103 71449

MAXQDA (Version 11) [Computer Software]. Berlin, Germany: VERBI.

Miller, K., Riley, W., & Davis, S. (2009). Identifying key nursing and team behaviors to achieve high reliability. *Journal of Nursing Management, 17*, 247-255.

Nembhard, I. M., & Edmondson, A. C. (2006). Making it safe: The effects of leader inclusiveness and professional status on psychological safety and improvement efforts in health care teams. *Journal of Organizational Behavior, 27*, 941-966. doi:10.1002/job.413

Nyikos, M., & Hashimoto, R. (1997). Constructivist theory applied to collaborative learning in teacher education: In search of ZPD. *The Modern Language Journal, 81*(4), 506-517.

O Connor, M. K., Netting, F. E., & Thomas, M. L. (2008). Grounded theory: Managing the challenge for those facing Institutional Review Board oversight. *Qualitative Inquiry, 14*(1), 28-45. doi:10.1177/1077800407308907

Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Puvathingal, B. J., & Hantula, D. A. (2012). Revisiting the psychology of intelligence analysis: From rational actors to adaptive thinkers. *American Psychologist, 67*(3), 199-210. doi:10.1037/a0026640

Reason, J. (2000). Human error: Models and management. *British Medical Journal, 320*(7237), 768-770.

Riley, W., Davis, S. E., Miller, K. K., & McCullough, M. (2010). A model for developing high-reliability teams. *Journal of Nursing Management, 18*(5), 556-563. doi:10.1111/j.1365-2834.2010.01121.x

Roussin, C. J. (2008). Increasing trust, psychological safety, and team performance through dyadic leadership discovery. *Small Group Research, 39*(2), 224-248. doi: 10.1177/1046496408315988

Seifert, K., & Sutton, R. (2009). *Educational psychology* (2nd ed.). Global Text Project. Retrieved from http://www.saylor.org/site/wp-content/uploads/2011/04/Educatio nal-Psychology.pdf

Singh, G., Hawkins, L., & Whymark, G. (2007). An integrated model of collaborative knowledge building. *Interdisciplinary Journal of Knowledge & Learning Objects (3)*, 85-105.

Stahl, G. (2000). A model of collaborative knowledge-building. In B. Fishman & S. O Connor-Divelbiss (Eds.), *Fourth International Conference of the Learning Sciences* (pp. 70-77). Mahwah, NJ: Erlbaum.

Straus, S. G., Parker, A. M., & Bruce, J. B., (2011). The group matters: A review of processes and outcomes in intelligence analysis. *Group Dynamics: Theory, Research, and Practice, 15*(2), 128-146.

Swartz, A. L., & Triscari, J. S. (2011). A model of transformative collaboration. *Adult Education Quarterly, 61*(4), 324-340. doi:10.1177/0741713610392761

Tetlock, P. E., & Mellers, B. A. (2011). Intelligent management of intelligence agencies: Beyond accountability ping-pong. *American Psychologist, 66*(6), 542-554. doi:10 .1037/a0024285

Tjosvold, D., Yu, Z., & Hui, C., (2004). Team learning from mistakes: The contribution of cooperative goals and problem-solving. *Journal of Management Studies, 41*, 1223-1245.

Vygotsky, L. S. (1978). Interaction between learning and development (M. Lopez-Morillas, Trans.). In M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.), *Mind in society: The development of higher psychological processes* (pp. 79-91). Cambridge, MA: Harvard University Press.

Walker, D. & Myrick, F. (2006). Grounded theory: An exploration of process and procedure. *Qualitative Health Research, 16*(4). 547-559.

Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly, 38*(4), 628-652. Available from http://asq.sagepub.com

Weick, K. E. (1995). South Canyon revisited: Lessons from high reliability organizations. *Wildfire, 4*(4), 54-68. Retrieved from http://www.fs.fed.us/t-d/pubs/htmlpubs/htm 95512855/page15.htm

Weick, K. E., & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity*. San Francisco, CA: Jossey-Bass.

Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty* (2nd ed.). San Francisco, CA: Wiley.

Wilson, K. A., Burke, C. S., Priest, H. A., & Salas, E. (2005). Promoting health care safety through training high reliability teams. *Quality and Safety in Health Care, 14*(4), 303-309. doi:10.1136/qshc.2004.010090

Wilson, K. A., Salas, E., Priest, H. A., & Andrews, D. (2007). Errors in the heat of battle: Take a closer look at shared cognition breakdowns through teamwork. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 49*, 243-256. doi:10.1518/001872007X312478

Yen, J., Fan, X., Sun, S., Hanratty, T., & Dumer, J. (2006). Agents with shared mental models for enhancing team decision makings. *Decision Support Systems, 41*(3), 634-653.

APPENDIX. STATEMENT OF ORIGINAL WORK

Academic Honesty Policy

Capella University s Academic Honesty Policy (3.01.01) holds learners accountable for the integrity of work they submit, which includes but is not limited to discussion postings, assignments, comprehensive exams, and the dissertation or capstone project.

Established in the Policy are the expectations for original work, rationale for the policy, definition of terms that pertain to academic honesty and original work, and disciplinary consequences of academic dishonesty. Also stated in the Policy is the expectation that learners will follow APA rules for citing another person s ideas or works.

The following standards for original work and definition of *plagiarism* are discussed in the Policy:

> Learners are expected to be the sole authors of their work and to acknowledge the authorship of others work through proper citation and reference. Use of another person s ideas, including another learner s, without proper reference or citation constitutes plagiarism and academic dishonesty and is prohibited conduct. (p. 1)

> Plagiarism is one example of academic dishonesty. Plagiarism is presenting someone else s ideas or work as your own. Plagiarism also includes copying verbatim or rephrasing ideas without properly acknowledging the source by author, date, and publication medium. (p. 2)

Capella University s Research Misconduct Policy (3.03.06) holds learners accountable for research integrity. What constitutes research misconduct is discussed in the Policy:

> Research misconduct includes but is not limited to falsification, fabrication, plagiarism, misappropriation, or other practices that seriously deviate from those that are commonly accepted within the academic community for proposing, conducting, or reviewing research, or in reporting research results. (p. 1)

Learners failing to abide by these policies are subject to consequences, including but not limited to dismissal or revocation of the degree.

Statement of Original Work and Signature

I have read, understood, and abided by Capella University s Academic Honesty Policy (3.01.01) and Research Misconduct Policy (3.03.06), including the Policy Statements, Rationale, and Definitions.

I attest that this dissertation or capstone project is my own work. Where I have used the ideas or words of others, I have paraphrased, summarized, or used direct quotes following the guidelines set forth in the APA *Publication Manual*.

Signed:	Margaret M. Spezia
Mentor:	Chandra M. Mehrotra, PhD, Harold Abel School of Social and Behavioral Sciences