PERCEPTIONS OF ORGANIZATIONAL LEARNING CULTURE IN THE AEROSPACE INDUSTRY

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A DISSERTATION

Presented to the Affiliated Faculty of
The College of Graduate and Professional Studies
at the University of New England

Submitted in Partial Fulfillment of Requirements
For the Degree of Doctor of Education

It was presented on
08/09/2023
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Date: August 9, 2023

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ABSTRACT

The aerospace industry operates in a dangerous and unforgiving environment. Building organizations that understand the environment and learn from successes and failures becomes critical to success. Creating a culture of organizational learning then becomes essential. The purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Eleven individuals participated in structured, written interviews that provided the participants with an open forum for others to understand their experiences in organizational learning cultures in the aerospace industry. These interviews were evaluated and then manually coded into themes. The developed themes included the importance of communication in the organization, the importance of transparency in the organization, and the importance of establishing, building, and maintaining trust in the organization. The participants in this study described organizations where they had experienced poor communication, experienced conditions of distrust, and experienced a lack of transparency from within their organization. Recommendations for further action are for organizations to realize that these study results represent a narrow view of a large industry. Organizations looking to build a culture of organizational learning should begin by assessing the effectiveness of their organizational communication methods; establish mechanisms for precise and consistent communication of goals and objectives at the organizational, group, and individual levels; and benchmark organizational trust attributes against peer organizations.

Keywords: *aerospace, learning organization, organizational learning culture*

DEDICATION

For Casey and Troy, without you, none of this would have been possible.

ACKNOWLEDGEMENTS

To my advisors, Dr. Andrea Disque and Dr. Jennifer Galipeau, thank you for your unending patience and encouragement. Please note that the words "source" and "according to" have been removed from my lexicon.

To my participants, thank you for your time and experience.

To my mom and dad and the rest of the Collins, Tollett, McIntire, and Zalinsky clans, thank you for your support and encouragement. Please update my contact info on your phones.

To Dr. Nancy Owens for starting me on this path. This is the last time I will turn an off-the-cuff remark into a five-year journey.

To Rich Larson and Col. David Nuckles, thank you for the professional mentorship second to none and the overly kind words that convinced the UNE Admissions Office to give me a chance.

And to Mr. Bickford, Mrs. Calder, Mr. Clement, Mr. Dusseault, and Mr. Kent for giving me an unparalleled educational foundation that influences me to this day.

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CHAPTER 1: INTRODUCTION

The concept of a learning organization generally involves identifying and developing characteristics of an organization's culture and climate that nurture a learning culture (Senge, 1990). Johnston and Hawke (2002) defined a learning culture as "…the existence of a set of attitudes, values, and practices within an organization which support and encourage a continuing process of learning for the organization and/or its members" (p. 9). Senge (1990) originally defined learning organizations as places "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together" (p. 3). Cleveland and Plastrik (1995) further described a learning organization as a place that provides principles and practices that enable organizational learning to occur.

Garvin (2003) later added that a learning organization is a collection of individuals grounded in the principles of learning. Pedler et al. (1997) and Sambrook and Stewart (2000) described a learning organization as one that facilitates the learning of its members and strives for continuous transformation based on new information. Garvin (2003) further suggested that a learning organization had unique characteristics that included a defined learning agenda, being open to new information, attempting to minimize repeated mistakes or errors, retaining critical knowledge (not necessarily individuals with the knowledge), and acting on knowledge resident in the organization.

Watkins and Marsick (1993) defined a learning organization as one that learns continuously and transforms itself. They believed that a learning organization was not simply a collection of individuals that were learning inside of an organization but as a process occurring at the individual, group, and organizational levels. Watkins and Marsick (1996) identified seven

features of a learning organization: continuous learning opportunities, inquiry and dialogue, collaboration and team learning, systems to capture and share learning, a collective vision, connection to the company's environment, and strategic leadership for learning. Watkins and Marsick (1996) emphasized the role of the employee or the members of an organization when describing a learning organization.

In a rapidly changing and highly technical environment, an organization's success does not entirely depend on its workers' skills and abilities. Instead, it relies on their ability to improve continuously (Somerville & McConnell-Imbriotis, 2004). This idea led to the concept of organizational learning culture (Škerlavaj et al., 2007). Škerlavaj et al. (2007) defined organizational learning culture as "a set of norms and values about the functioning of an organization" (p. 346). Organizational learning culture helps an organization to continuously improve by adapting to changing environments by enhancing the capacity to improve performance and apply self-transformation (Gerrard & Cunningham, 2000; Senge, 1990). Gerrard and Cunningham (2000) argue that it is essential for organizations to have the ability to adjust to any unforeseen changes. Learning culture in an organization enhances an employee's and the organization's performance (Behn, 2003).

A question can then be asked, does organizational learning exist and persist because of the learning culture in an organization, or does an organization demonstrate an influential and positive learning culture because organizational learning is taking place? van Breda-Verduijn and Heijboer (2016) argued that organizational culture creates the proper conditions for organizational learning to take place. They further argued that to maximize the potential of a learning organization, the organization must analyze its culture (van Breda-Verduijn & Heijboer,

(2016). Analysis of this nature could lead to identifying and removing barriers to learning and enhancing creativity and innovation (Planing, 2017).

The number of private companies supporting the United States aerospace industry has steadily increased from the early days of the National Aeronautics and Space Administration's (NASA) Mercury Program (Smith et al., 2020). This increase has also resulted in many engineers, scientists, and technicians with unique skill sets and knowledge bases working in government or across a growing number of companies supporting the aerospace industry (Aerospace Engineer Demographics, 2021). Within each government organization or private company, these individuals are exposed to learning cultures that are unique to their location, as all organizations have their own distinct learning culture (van Breda-Verduijn & Heijboer, 2016). Turkina et al. (2016) described the aerospace industry as "covering the manufacture of air and spacecraft and related machinery" (p.1217). Aerospace industry members engage in activities ranging from research, design, development, test, manufacturing, and operation of flight vehicles. These flight vehicles include unpowered gliders, unmanned aerial vehicles (UAVs), lighter-than-air craft, heavier-than-air craft, missiles, space launch vehicles, and spacecraft (Rebolledo & Nollet, 2011).

The Wright brothers were the first to achieve powered and sustained flight in 1903 (Pritchard, 1954). While their achievements demonstrated the ability to fly, it sparked the beginning of a new industry that started private and commercial development of various aircraft, according to Pritchard (1954). World Wars I and II ushered in a new front in war fighting with the recognition of the strategic advantage that the air held (Saunders & Souva, 2020). Soon, piston engines gave way to jet engines, and routine subsonic flight gave way to supersonic flight (roughly speeds greater than 768 miles per hour) (Smith, 2022). As time progressed and

technology improved missile development became an addition to United States, Soviet, and European countries' offensive and defensive capabilities (Saunders & Souva, 2020). These technologies were then utilized in the early stages of the space age (Stares, 2021). The launch of Sputnik in 1957 demonstrated the ability to launch an artificial satellite and maintain it in orbit around the Earth (Dickson, 2019). Yuri Gagarin's 1961 flight aboard Vostok 1 began humankind's exploration of inner and, eventually, outer space (Dickson, 2019).

The United States responded to Soviet advances in space with their programs; Pioneer, Mercury, Gemini, Apollo, Mariner, Skylab, Viking, Space Shuttle, Voyager, International Space Station, and Mars Exploration (Launius, 1999; Brown, 2009). These are just a few of the many programs that began with an idea and spurred research, innovation, and operational systems (Eccles et al., 2021) that were only read about in fiction novels one hundred years earlier. Newer programs have initiated further growth and development in the aerospace industry (Eccles et al., 2021). Federal programs such Space Launch Systems and Lunar Gateway combined with private industry players such as SpaceX, Blue Orgins, and Rocket Labs have partnered to make space more accessible than ever before and position themselves to make space a routine destination (Shammas & Holen, 2019).

For over 200,000 years, the modern form of humans walked the Earth and looked to the heavens, never getting much higher than a few hundred feet in unpowered vehicles. Yet in the last 120 years, humans have achieved sustained, powered flight (Pritchard, 1954), orbited the Earth and walked on the moon (Dickson, 2019), remotely explored other celestial objects (Braun & Manning, 2006), and traveled past the edge of our solar system in uncrewed systems (Linsky et al., 2018). Humankind did not get from Kitty Hawk, North Carolina to the moon through a series of unrelated events. One can trace a direct line through the combined experiences,

experiments, successes, and failures that made these accomplishments possible (Hanel, 2017). Like scaffolding in education, early successes and failures formed the foundation of knowledge that made subsequent advancements possible (Hanel, 2017).

Taking this knowledge through a series of failures and successes is what Osborne and Wittrock (1983) described as generative learning. Osborne and Wittrock (1983) explained that generative learning is the integration of new ideas and experiences into a learner's existing knowledge base and formative understanding. These new ideas or experiences can result from successes and failures. The notion of generative learning aligns with Örtenblad's (2018) assessment that the organizational environment, and the culture created, facilitate learning among the individuals within the organization.

Marsick and Watkins (2003) believed that an influential organizational learning culture is established by an organization's leadership and key stakeholders. Marsick and Watkins (2003) argue that individual leaders and stakeholders can learn from their own experiences and the experiences of others. Ownership and stakeholders can influence organizational learning and create a culture that identifies, supports, and rewards efforts that model desired results (Marsick & Watkins, 2003). Fostering these attributes supports an effective learning culture where knowledge is created, distributed, and retained, leading to innovation (Alsalami et al., 2014), improved performance (Behn, 2003), and improved decision-making (Akinci & Sadler-Smith, 2019), among other positive improvements. While organizational leaders and stakeholders can create, influence, or change an organization's learning culture, it is essential to assess the perception from the viewpoint of various members of the organization (Levering, 1996).

Definition of Key Terms

Aerospace Industry. Turkina described the aerospace industry as "covering the manufacture of air and spacecraft and related machinery" (2016, p. 1217). Through personal experience, the researcher would add activities that include the design, development, test, evaluation, manufacture, operation, and disposal of components, systems, and vehicles intended to operate in an atmospheric or space environment.

Individual level learning. Individual-level learning is "the way in which people make meaning of their experiences, and how the organization provides them with the opportunities to build the knowledge and skills" (Watkins & Marsick, 1999, p. 80).

Learning Culture. Learning Culture is "the beliefs, values, and behaviors a person or a group of people have with regard to their own 'learning' in specific contexts" (Sagy et al., 2018, p. 418)

Learning Organization. A learning organization is a place "where people continually expand their capacity to create the results, they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together" (Senge, 1990, p. 3)

Organization level learning. Organizational-level learning is the "shared thinking and the capacity of a system that is embodied in systems, procedures, artifacts, and mental models" (Watkins and Marsick, 1999, p. 81).

Team/Group level learning – Team/group level learning is "the way in which groups of people work and learn collaboratively and create new knowledge together as well as the capacity for collaborative action" (Watkins & Marsick, 1999, p. 80).

Statement of the Problem

To date, there has been a significant amount of research surrounding the concept of a learning organization and its associated culture (Hsu & Lamb, 2020; Korn et al., 2021; Örtenblad, 2018; Senge, 1990; Vince, 2018). Research has shown that organizations with an internal culture that leans toward supporting learning, known as learning culture, have higher performance levels (Lim, 1995). Many studies over the years have shown that organizations with strong learning cultures show improved performance, innovation, and employee satisfaction (Ellinger et al., 2002; Habtoor et al., 2017; Kim et al., 2017; Kontoghiorghes et al., 2005; Sharma, 2020; Yadav & Rajak, 2021). These studies have assessed a variety of different industry settings and occupational disciplines. However, for the aerospace industry specifically, there is no discoverable, current research that describes or characterizes learning culture.

There is a gap in the research literature on employee perception of organizational learning culture in the aerospace industry. Levering (1996) found that organizations with a strong learning culture, among other things, may attract knowledgeable individuals. Similarly, Garvin (1993) noted, "organizations that are skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights" possess the attributes of a strong learning culture (p.80). Jo and Joo (2011) found that organizations with a learning culture enhance employee commitment and retention. These studies show that organizations that exhibit learning cultures attract outside knowledge, create, acquire, and transfer knowledge, modify behavior to adapt to the knowledge, and retain individuals and knowledge.

Organizational leaders should, therefore, understand employees' perceptions of learning culture so that they may provide the necessary resources and support to facilitate the creation, distribution, and retention of knowledge (Škerlavaj et al., 2007).

Purpose of the Study

This purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Pantouvakis and Bouranta (2017) described an organizational learning culture as one that encourages employees to refresh and increase their individual knowledge, seek to become skilled in new technologies, and expand their capabilities following environmental change. This description builds on Škerlavaj et al. (2007) definition of an organizational learning culture, "a set of norms and values about the functioning of an organization" (p. 347). Škerlavaj et al. (2007) built on Marsick and Watkin's (2003) contention that culture is established by an organization's leadership and critical stakeholders who possess the ability to learn from their and others' experiences, can influence learning throughout an organization and can create an environment that identifies, supports, and rewards efforts that model desired results.

Watkins and Marsick (1996; 2003) identified seven dimensions of organizational learning culture across the individual, group, and organizational levels of an entity. These dimensions, or interdependent action imperatives, characterize organizations attempting to strengthen their position as a learning organization. According to Watkins and Marsick (1996), an organization should (1) establish an environment that continuously supports learning; (2) promote inquiry and dialogue among its members; (3) encourage collaboration and team learning; (4) create or provides a system for capturing and sharing knowledge; (5) create a collective vision; (6)

connect the organization to its external environment; and (7) have leadership that provides strategic support for learning.

Watkins and Marsick (1996; 2003) also acknowledged that learning takes place at different levels of an organization, at the individual level, at the group or team level, and the organizational level. As a basic example, the corporation would be considered the organizational level within a generic corporate structure. Learning at this level is generally broad, general topics such as corporate culture, policies, and procedures (Pham, 2006). The focus is generally on what is unique about the corporation and what differentiates it from similar companies.

Stepping down from the organizational level, an example of a group or team could be the human resource function. Within human resources, there might be manager responsible for the running of the group; recruiters and talent managers that are responsible for finding applicants, bringing them through the employment process, and developing their skills over time; payroll and benefits professionals that understand the laws, rules, and requirements governing compensation; compliance professionals that ensure that the policies and procedures of the company are following federal, state, and local laws; and perhaps workplace safety professionals that provide that all of the corporations employees work in a safe environment. Generally, all these individuals work as a team within the overall organization and have knowledge, skills, and expertise that is common among those in the group (Balbastre et al., 2003, Wilson et al., 2007). These skills are not necessarily required outside the group, in a finance or legal department.

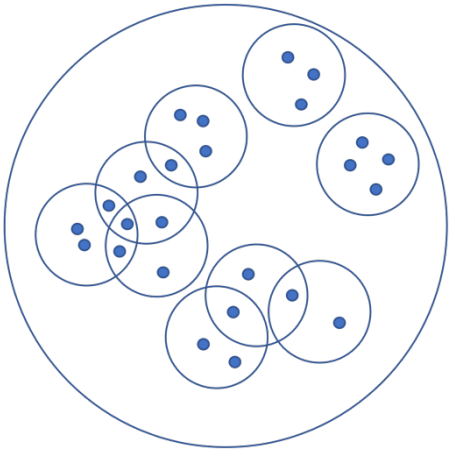
Finally, each of the employees in the corporation, from the CEO to a just-hired intern, make up the individual level in Watkins and Marsicks' (1996; 2003) framework. Each person brings a particular set of skills, experience, and knowledge that needs to be maintained and developed for them to continue to excel in their position (Knowles, 1968). In addition to

understanding the organizational level requirements and the team or group level tasks, a recruiter in the human resources office might need specialized training for their specific duties. Training and learning that can be shared with other recruiters (another small team or group within the human resources group) or clear to just them in the disposition of their responsibilities.

Taking this example out of the generic corporate structure, and putting it into a fictionalized aerospace setting, many of the same observations can be made. Omega Aerospace (Omega), a fictionalized aerospace company, is building a rocket that will take a crew of five to lunar orbit where they will descend to the lunar surface, conduct activities, return to lunar orbit, and return to Earth, oddly will have a lot of the same characteristics described above, but with a lot more complexity at the team level, as shown in Figure 1. In this example, Omega represents the larger circle's organizational learning level. Omega will have a culture, and they will have policies and procedures for day-to-day operations. They will have processes that govern how they run and how they expect their employees to participate in the performance of their jobs (Aboramadan et al., 2019). Omega will comprise potentially hundreds of employees, from the CEO to the recruiter, to the newly hired electrical engineer that just graduated, represented by smaller dots. Everyone will have their own needs when it comes to learning and their personal development. Where the complexity comes in at the group or team level of learning, represented by the smaller circles.

Figure 1

Organizations, groups, and individuals make up the larger whole.



In the previous example, where multiple recruiters might make up a small group or team within the human resources group, one would assume that the cultural perspective of learning remains consistent with the larger group. In the case of Omega, and other real-life organizations, there could be added complexity (Feinman, 2011, Hall et al., 1967). An electrical engineer could contribute to multiple systems at multiple mission stages. For example, an electrical engineer could provide expertise simultaneously to an electrical and power systems (EPS) team, a thermal conditioning (TC) team, a command and data handling team (C&DH), and a propulsion (Prop) team, as each of these systems incorporate electrical engineering principles in their design and operation. Additionally, this electrical engineer might provide insight and guidance on the launch vehicle, the orbital vehicle, the lunar descent and accent vehicle, and the return vehicle. The engineer in this fictitious company might belong to several teams at once. Each of those teams may have a different focus or view on the culture of learning. An experienced team that has decades of practical knowledge in launching vehicles might view learning culture differently from a team that only has theoretical knowledge of landing on celestial objects.

Understanding that group or team learning needs can differ significantly between the organization and the individual, different concepts have been developed over time to accommodate these needs (Grieser et al., 2016; Lewis, 2014; Rhodes & Dawson, 2013). Communities of practice (CoP), lessons learned systems, after-action reports, Suspect Condition Action Notices (SCAN), and the Government Industry Data Exchange Program (GIDEP) are just a few examples of mechanisms that are intended to share knowledge across a more significant number of interested people or across people that have a common focus but are not necessarily in the same group. These concepts will be discussed further in Chapter 2.

Research Question(s) and Design

This study, grounded in Knowles' (1968) adult learning theory, seeks to answer the following research questions:

Research Question 1: How do aerospace industry professionals describe organizational learning culture?

Research Question 2: How do aerospace industry professionals perceive benefits associated with organizational learning culture?

Research Question 3: How do aerospace industry professionals perceive challenges related to organizational learning culture?

Conceptual and Theoretical Framework

Ravitch and Riggan (2017) defined conceptual frameworks as "an argument about why the topic one wishes to study matters, and why the means proposed to study it are appropriate and rigorous" (p. xv). Ravitch and Riggan (2017) also note that there is a personal reason for the research, which has meaning to the researcher. The following section defines the conceptual

framework for the proposed study based on the theoretical work of Knowles' (1968) adult learning theory.

To address the first half of Ravitch and Riggan's (2017) definition, the aerospace industry has seen rapid growth and advancement of technology over its relatively brief lifespan (Jose et al., 2020). NASA's Apollo Program innovated to produce new technologies that impact our daily life today (Jolliff & Robinson, 2019). Advancements such as freeze-dried foods, flame-resistant fabrics, and fluid recycling emerged from the space program's early days (Apollo Spinoffs, 2022). These spinoffs represent a form of learning whereby secondary advancements are understood and brought to market, solving similar but different problems (O'Shea et al., 2005). Spinoffs represent an example where, at the highest level of an organization, the characteristics of a learning organization, openness, humility, adaptability, and the ability to learn from success and failures, are demonstrated (Odor, 2018; Örtenblad, 2018; van Breda-Verduijn & Heijboer, 2016).

Conversely, the Space Shuttle Columbia disaster in 2003 began the eventual end of the Space Shuttle Program, according to the Columbia Accident Investigation Board (CAIB) (NASA, 2003). Along the way, billions of dollars have been spent, and many lives have been lost during the development, test, and execution of new systems (Donahue & O'Leary, 2011). NASA continues to encourage learning from these accidents through open and transparent investigations, as was evidenced by the public release of the Apollo, Challenger, and Columbia accident investigations and the ongoing publication of their lessons learned database. Incident investigations, root causes, and corrective actions are intended to inform the industry as a means of learning from mistakes to prevent similar incidents in the future (Garud et al., 2011; Lampel et al., 2009; Starbuck, 2017).

Adult learning theory, or andragogy, provides the theoretical framework for this research. Developed by Knowles (1968), this theory posits that adult learning is distinct and identifies the learning styles which suit adults best. Among Knowles' (1968) work were four assumptions surrounding adult education. This list was later expanded in 1980 and 1999 to include two additional beliefs: (a) the need to know why they (the adult learner) need to learn something, (b) the learner's self-concept, (c) prior experience(s), (d) readiness to learn, (e) orientation to learning, and (f) motivation (Knowles et al., 2005).

According to Cochran (2015), organizations that acknowledge and leverage some, all, or none of these assumptions surrounding adult education are creating a learning culture within their organization. Sagy et al. (2018) defined learning culture as "the beliefs, values, and behaviors a person or a group of people have regarding their own 'learning' in specific contexts" (p. 418). Organizations that embrace and apply the concepts of andragogy may better meet the needs of the adult learners within their organization (Cochran, 2015).

Adult learning theory (Knowles, 1968) provides a lens for the researcher to consider how adults learn, how organizations can support adult learning in the workplace, and how learners may perceive their organization's learning culture. Watkins and Marsick (1993) and Marsick and Watkins (1996) used adult learning theory as the basis for the design of their Dimensions of Learning Organization Questionnaire (DLOQ), which was used as the basis for interview questions in this study.

Assumptions, Limitations, and Scope

Assumptions in research are those elements primarily out of the researcher's control, yet if they no longer existed, they would render the research irrelevant (Simon, 2011). As of August 2020, there were nearly 18,000 civil servants across multiple NASA centers (WICN, 2020).

Including contractor support, that number may increase by another 60,000 employees, by some estimates (Employee Orientation, 2021). It should be recognized that industry estimates suggest there are over 500,000 individuals in the United States supporting the field in one form or another (Aerospace Industry Spotlight, 2021). The researcher assumed that the study participants' perceptions represented the larger population of individuals in the aerospace industry. The researcher further assumed that participants could provide detailed information to help answer the two research questions defined in this study. The researcher also assumed that participants would act ethically by providing truthful responses to questions and that participants will reflect authentically upon their professional practice and experiences. The researcher was also assumed to portray the participant's input accurately.

Roberts (2010) described limitations as those items that are out of the researcher's control and may negatively affect the study's results. In this study, a small sample size may have limited the ability to generalize the findings broadly across the aerospace industry and how they apply to employees at any location. A second limitation of this study may have existed in the use of structured, written interviews as a means for capturing data. There was the potential for a participant to misunderstand questions or for the researcher to misinterpret responses. The nature of the questions may lead to more expansive answers from the participants than time will allow. This results in either not fully answering individual questions or not receiving answers to all potential questions. To mitigate this limitation, the researcher provided a critical explanation of terms that may be misinterpreted.

The scope of this study was limited to aerospace industry professionals. As there is no single directory of individuals working in the industry, participants were drawn from the American Institute of Aeronautics and Astronautics (AIAA). AIAA has nearly 30,000 members

and is the world's largest technical society dedicated to the aerospace profession (About AIAA, 2022). The researcher requested and was permitted to use the AIAA Engage electronic bulletin boards as a centralized place to solicit participation from the AIAA members.

Rationale and Significance

The aerospace industry, in general, is a dynamic one. With the advent of new technologies and shifting customer needs, every company supporting the industry faces threats and opportunities that align with or run counter to their strengths and weaknesses (Pantouvakis & Bouranta, 2017). How a company organizes and responds to those new technologies and shifting needs may shape its future successes or failures (Malik & Garg, 2020). Ellinger et al. (2002) noted a positive link between an organization's performance and its organizational learning culture. Kontoghiorghes et al. (2005) assessed relationships between the characteristics of a learning organization and an organization's ability to adapt, innovate, and perform. Finally, Škerlavaj et al. (2007) examined the link between organizational learning culture and business process change and performance and found a positive correlation.

What these studies show is that for an organization, there is a learning culture present, even if it is a culture where learning is marginalized (Ellinger et al., 2002; Kontoghiorghes et al., 2005; Malik & Danish, 2020; Pantouvakis & Bouranta, 2017; Škerlavaj et al. 2007). Depending on the culture created from an organization's inception or deliberately crafted over time, the impacts of that culture are felt at the individual, team, and organizational levels (Kim et al., 2017). The strength of that learning culture can positively impact performance, innovation, and success, again at the individual, team, and organizational levels (Hung et al., 2010). Within the aerospace industry, positive impacts on performance, innovation, and success can be indicators of a safer and lower-risk operating environment (Jiménez-Jiménez & Sanz-Valle, 2011).

Within most organizations, the tools and conditions for the implementation of a learning culture are provided in a top-down manner, in that it is leadership that can provide the resources for learning and the authority to pursue the establishment or creation of a culture that values learning (Sofo et al., 2013). Implementation of that culture is a bottom-up endeavor, meaning that individuals must take advantage of those resources to be useful (Sofo et al., 2013). How that culture is perceived from these two viewpoints may be completely different (Kim et al., 2017), and assessing employees' perceptions can lead to either reinforcing continued action or necessitating change (Behn, 2003). As Behn (2003) argues, by measuring an organization's performance, or the organization's perception of its learning culture, the organization can learn what it is doing effectively and what it is doing ineffectively. Effective actions can continue, while ineffective actions can be changed or modified (Behn, 2003).

With more companies, large and small, entering the aerospace industry, the pace of change, the risk involved in the variety of missions, the impact of the industry on the worldwide economy, and the number of individuals supporting the industry, it is worthwhile to step back and assess how the individuals perceive the learning culture in their industry (Genta, 2014). This study will allow individuals to share their experiences and perceptions of learning cultures. The researcher also hopes that those experiences and perceptions will contribute to evaluating learning culture across different organizations.

Summary

This qualitative phenomenological study sought to explore aerospace industry professionals' perceptions of learning culture. By examining the perceptions of individuals working in the aerospace industry, this study will document employee perceptions about the learning culture as it exists in the aerospace industry. Further, by analyzing the perceptions of

individuals working in the aerospace industry, this study attempted to fill the void in research on organizational learning culture in the aerospace industry.

This study collected data through structured written interviews with aerospace industry professionals to answer the questions of employee perception of organizational learning culture, the perceived benefits, and the perceived challenges. Responses to the interview questions were used to understand their experiences and reflections on organizational learning culture in the industry. Participants shared their experiences or organizational learning culture within the context of their organizations. This study has contributed to the understanding of organizational learning culture and a better understanding of how it impacts the aerospace industry and its stakeholders.

Chapter 2 includes a literature review that explores the meaning of organizational learning, the learning organization, organizational learning culture, the benefits and challenges to their creation and sustainment, organizational learning in high-technology settings, and the systems that can be used to sustain them. In Chapter 3, the methodology and research design are provided. This chapter explains how the interviews were conducted and how the data will be interpreted. Chapter 4 reviews and analyzes the study's results and findings. Chapter 5 presents the interpretations, importance, and implications of the findings.

CHAPTER 2: LITERATURE REVIEW

This literature review on the perception of learning organizations in the aerospace industry draws from various sources. Chapter 2 offers a discussion of the literature related to organizational learning, learning organizations, and organizational learning culture and how it impacts a variety of disciplines and industries. It outlines the role organizational learning plays as a general theme and distills that notion down to a particular industry type.

The number of private companies supporting the United States aerospace industry has increased since the early days of NASA's Mercury Program. Prior research has focused on NASA and the United States Air Force's efforts to ensure mission success in future programs (Abbot, 2010; Haunschild, 2009; Mahler & Casamayou, 2009; Patrick, 2018; Starbuck, 2017; Templeton & Dowdy, 2012). Examination of these studies shows that the research does not evaluate the aerospace industry in general. This literature explores organizational learning across a broad spectrum of industries and looks at the following specific elements: (1) the learning organization, organizational learning, and organizational learning culture; (2) the benefits of an organizational learning culture; (3) challenges of an organizational learning culture; (4) organizational learning in high technology settings; and (5) systems to promote organizational learning and develop culture.

Conceptual and Theoretical Framework

Ravitch and Riggan (2017) defined conceptual frameworks as "an argument about why the topic one wishes to study matters, and why the means proposed to study it are appropriate and rigorous" (p. xv). As a 20-year participant in the aerospace industry, the adverse outcomes that have manifested themselves have become intensely personal. Ensuring root causes are not

repeated through a positive culture of learning is paramount. The following section defines the conceptual framework for the proposed study.

On January 27, 1967, astronauts Gus Grisom, Ed White, and Roger Chaffee were killed during a "plugs out" test of the Apollo 1 crew capsule. The test was designed to demonstrate all space vehicle systems and operational procedures as practical and to verify systems capability in a simulated launch (Apollo 1, n.d.). During the test, a spark ignited the capsule and claimed the lives of the three astronauts. While the cause of the spark was never conclusively identified, a sealed cabin with a 100% oxygen atmosphere, an excessive volume of combustible material (Velcro), wiring carrying full spacecraft power, and inadequate provisions for rescue and medical assistance were identified as contributing causes to the tragedy (Apollo 1, n.d.). These contributing factors led to design or procedural changes to preclude a similar accident in the future.

On January 28, 1986, astronauts Francis Scobee, Michael Smith, Ronald McNair, Ellison Onizuka, Judith Resnik, Gregory Jarvis, and Christa McAuliffe were killed when the Space Shuttle Challenger exploded 73 seconds after launch. The cause of the accident was primarily identified as propellent burning through the solid rocket booster O-rings and the external fuel tank igniting the fuel. Contributing causes were operations outside of nominal operating temperature and flaws in the decision-making process that led to waiving launch constraints (United States. National Aeronautics and Space Administration, 1986). Again, the cause and contributing causes were addressed, and changes to the design and process were made to preclude a similar accident in the future.

On September 23, 1999, communication with the Mars Climate Orbiter was lost after it began the planned insertion burn that would place it in orbit above Mars. The cause of the failure

was determined to be a navigational error when commands were sent to the spacecraft in English units without being converted to metric standard units (In-Depth Mars Climate Orbiter – NASA Solar System Exploration, n.d.). The failure led to agency-wide changes to prevent a similar accident from happening in the future.

On February 1, 2003, astronauts Rick Husband, William McCool, Michael Anderson, Kalpana Chawla, David Brown, Laurel Clark, and Ilan Ramon were killed when the Space Shuttle Columbia disintegrated during reentry. During the launch and ascent phase, foam insulation separated from the external tank and struck the orbiter wing's leading edge, punching a hole in the vehicle. During reentry, superheated gases entered the hole melting the supporting structure and rendering the vehicle inoperable, leading to a complete structural collapse. The foam insulation problem was an existing, known problem that would not be fully corrected on any of the subsequent 22 launches (Gehman, 2003). However, the Columbia Accident Investigation Board produced 29 recommendations on everything from the thermal protection system to organizational structure to ensure that a similar problem would not occur in the future (NASA, 2003).

The aerospace industry is replete with failures that become common knowledge because of their spectacular nature, two prime examples being the Challenger and Columbia Shuttle disasters (Hogeback, 2021). There are potentially more failures classified as near-misses, escapes, or close calls that don't resonate with the public because they do not end badly (BevenFlorez, 2017). For example, on a routine ferry flight of the Space Shuttle Atlantis from Edwards Air Force Base to Kennedy Space Center, the shuttle was improperly secured to the Boeing 747 ferry vehicle (CNN, 1997). The failure was discovered after a successful landing and only reported briefly in the news. These near misses become part of the culture within the

industry, not to be repeated but to be used as learning devices to prevent the next incident (Ganopol et al., 2017). Alongside the failures come impressive successes, often small and unnoticed but essential for the sustainment of an unforgiving industry (Ganopol et al., 2017).

By conducting a phenonmeological study, the researcher can collect rich data that describes an intricate or complex phenomenon. Exploration of this type then comes through various lenses with which the participants observe and interact with the phenomenon (Rashid et al., 2019). Given that the lived experience of each participant is unique, the phenomenological study should draw out those perceptions that are common across the study group and those that are truly unique to an individual. All of which should provide a more rounded picture with nuanced understanding.

Theoretical Framework

This study uses Knowles' (1968) adult learning theory as the theoretical framework for this research. Developed by Knowles (1968), it posits that adults learn differently than adolescents and that adult learning (andragogy) is distinct and identifies the learning styles which suit adults best. Among Knowles' (1968) original work and later updated work are six assumptions: (a) the need to know why they (the adult learner) need to learn something, (b) the learner's self-concept, (c) prior experience(s), (d) readiness to learn, (e) orientation to learning, and (f) motivation (Knowles et al., 2005). These assumptions of andragogy differ from typical pedagogy, a system where adolescent learners bring little prior experience to their education, and learners are required to be present not because they desire to learn.

Knowles (1990) and Mezirow (1991) valued the community; in a professional setting, this could be seen as the group or organizational level to enhance learning. Knowles (1990) and others also viewed adult learning as a lifelong journey (Collins, 2004; Knapper, 1988; Kungu &

Machtmes, 2009; Rüber et al., 2018). From his six assumptions, Knowles (1984) suggested four principles that applied to adult learning: (a) that adults need to be involved in the planning and evaluation of their instruction, (b) that experience (including mistakes and mishaps) provides the foundation for learning activities, (c) that adult learners are most interested in subjects that have immediate relevance to their job, and (d) that adult learning is problem-centered rather than content-centered. In the aggregate, Knowles' assumptions (1968) and principles (1984) can be viewed as the definition or outline of an organizational learning culture centered on the adult learner.

The Learning Organization, Organizational Learning, and Organizational Learning Culture

As discussed earlier, organizational learning, learning organization, and organizational learning culture are separate and distinct concepts. They are often used interchangeably, particularly organizational learning and learning organization, but each has distinct definitions and is used to convey different thoughts and meanings. While they are interrelated, the current literature does draw distinctions.

The Learning Organization

A learning organization is the place where that action occurs. Early research on the subject (Argyris & Schön, 1978; Hedberg, 1981; Peters & Waterman, 1982) focused on a learning organization as simply a place where learning occurs. By some accounts, this could be interpreted to mean every organization where learning takes place is a learning organization. By contrast, organizational learning generally defines the process or action by which an organization learns (Tsang, 1997).

Senge, generally credited as being the thought leader in the learning organization (Örtenblad, 2018), defined the term as a place "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together" (1990, p. 3). Senge's use of the term collective in the definition gives rise to the notion that organizational learning is not just centered on the individual, a place where individuals learn, but rather that the individual is one component in a more extensive learning network. Cook and Yanow (1993) similarly argued that an organization can learn either as an individual or a collective.

It is the act of working as a collective that often creates problems that a shared experience looks to solve. Vince (2018) noted that collaboration in a working environment is nearly at odds with an individual's innate sense of competitiveness when securing the resources necessary to complete a task or the recognition that goes along with the task. Vince (2018) believed that a true learning organization recognized the paradox between the organization's need for individuals to learn, collaborate, and contribute to the overall knowledge base and the individual's need to pursue their ends.

The axiom of doing more with less has represented a trend in recent years. Productivity is assessed in terms of efficiency, increasing the rate of change by reducing the cycle time necessary to create that change (Gellerman, 1986). Gellerman suggested that most environments maximize an organization's potential to succeed in common key performance indicators such as market share or revenue. That potential rests in the people, the employees of a company, and their collective abilities (Cierna et al., 2017).

Organizational Learning

Argote and Miron-Spektor (2011) contended that organizational learning is a change in an organization's knowledge that occurs as it gains experience. In this case, knowledge takes the form of both explicit and implicit (tacit) knowledge (Argote & Miron-Spektor, 2011). Explicit knowledge can be described as information or data that can be articulated, codified, stored, and accessed and can be easily transmitted to others (Cairó Battistutti & Bork, 2017; Hurley & Hult, 1998, Nonaka & Von Krogh, 2009). Implicit, or tacit knowledge, is experiential and intuitive and is best communicated verbally and face to face (Frappaolo, 2008).

McIver and Wang (2016) presented a framework for measuring the knowledge elements required to perform work by an organization. While this is a significant step, it cannot be used to determine if there has been a positive or negative change in the underlying knowledge of the organization. Additionally, this framework does not flag or indicate when a change has taken place, simply that a change has occurred. Rather than try to quantify the change, Coffey and Hoffman (2003) presented a framework for the descriptive measure of change. Since it is difficult to measure the depth and breadth of organizational learning, Coffey and Hoffman (2003) sought to provide a framework for the qualitative assessment of learning within an organization.

Finally, Akinci and Sadler-Smith (2019) found that organizational learning is a phenomenon that occurs when experiences are translated into positive changes in the organization's collective knowledge, cognition, and actions. The organizational context, or structure, plays a vital role in the learning process. Akinci and Sandler-Smith's (2019) research showed leaders and managers can have a positive impact on two aspects of learning. The first is fostering organizational learning through the facilitation of learning experiences. This entails the

ability to recognize and promote these opportunities. The second is cultivating an environment or corporate culture that seeks to translate individual learning into organizational learning.

According to the Bureau of Labor Statistics (2019), the attrition rate, or the rate at which individuals separate from an employer, has steadily increased. That means that there is a constant flow of knowledge leaving and entering an organization. Knowledge obtained from experience outside the organization could contribute to the overall learning of the organization. Rafique et al. (2019) noted that as more organizations are acquiring knowledge from outside of the organization, the notion of absorption becomes a narrow focus on the examination of organizational learning in general. Their study also assessed the behavioral elements that improve an individual's and an organization's ability to absorb and commoditize knowledge and information. Rafique et al. (2019) found, in part, that the accumulation of knowledge is necessary but not sufficient for organizational learning to take place. Thus, one cannot take the place of the other.

Organizational Learning Culture

Shin et al. (2017) wrote, "A learning organization doesn't rely on top management to tell it what to do but challenges the status quo and engages the resources and talents of all of its employees to achieve its organizational goals" (p. 46). What are the attributes of a learning organization culture that would permit an organization to challenge the status quo in this way? In addition to the seven dimensions identified by Watkins and Marsicks (1996, 2003) discussed earlier, Örtenblad (2004) offers four additional components. The first is creating an environment where employees learn in their work environment rather than in a place away from the job. In the second aspect, the organization creates a climate for learning by providing the tools and

opportunities for learning. This also includes the ability to experiment where the outcome of success or failure is instrumental in overall learning.

Other authors (Garvin, 1993; Pedler et al., 1997; Senge, 1990) have similarly focused on how the organization creates the climate for learning. While Shin et al. (2017) asserted that management does not prescribe the means, management certainly is responsible for maintaining an environment where learning can occur, is encouraged, and empowers employees to participate actively. Baird and Wang (2010) reasoned that empowerment is the transfer of power from management to the employees concerning authority, responsibility, and influence. This strips away the notion of responsibility for action without authority and allows employees at all levels of the organization to contribute to and sustain a culture of learning.

Though employee empowerment plays a crucial role, that is not to say that management simply relinquishes control and is absolved of responsibility. Weldy and Gillis (2010) looked at the variation in perception seen at different levels of an organization. They found that how organizational learning culture is viewed differs depending on the point of view. They concluded perspective was impacted by one's ability to tie performance to outcomes. With a higher level of perspective, managers could see across an organization and how interdependent teams or individuals performed.

In most cases, the individual employee was unable to see beyond their team environment. Weldy and Gillis (2010) also found a difference in the perception of empowerment. Specifically, managers believed employees had been fully empowered and that employees believed this extent to be limited in most cases.

Benefits of Organizational Learning Culture

Organizations looking to succeed will often undertake new initiatives. For example, a company looking to improve its bottom line will evaluate the initiative's cost and compare that to the calculated return on investment to determine if it will improve the company's profit perspective. Throughout the last few decades, several initiatives have been designed to improve some facet of an organization's performance. In the 1990s and early 2000s, Total Quality Management (TQM) (Fonseca, 2015), quality circles (Jimenez-Jimenez et al., 2019), ISO9000 (Aba & Badar, 2013), and the aerospace equivalent AS9100 were corporate methodologies designed to improve product or service quality. The Organizational Safety and Health Administration (OSHA) developed a program based on Dow Chemical's safety program called Voluntary Protection Program (VPP) (Davis & Booth, 2015) that was designed to improve the safety and health of workers. Organizations implementing these or similar systems are looking to benefit from the cost of implementation. That benefit isn't always strictly a financial benefit. Similarly, organizations with healthy organizational learning cultures see benefits in return for the time, energy, and resources devoted.

Innovation, learning transfer, and turnover intention are among the more widely discussed benefits of a learning culture. Innovation deals with the ability to adapt to change with a resulting new method, product, or idea. Learning transfer concerns an individual's ability to apply the concepts in knowledge gained from one setting and use them in the workplace. Turnover intention is the process one goes through when deciding to voluntarily leave a work environment. Each can result in positive or negative outcomes in an organization and, as discussed, can be positively correlated to the learning culture.

Innovation

A challenge of the aerospace industry is the need to solve problems with technologies that do not yet exist (Cerezo-Narváez et al., 2019). Many problems viewed as critical to completing a mission were met with entirely new solutions, such as wireless headsets, heart rate monitors, or radiation protection (Pool, 2019). As humans continue traveling further into the solar system and for longer durations, new problems will be uncovered that will require radical solutions (Blue et al., 2019; Doarn et al., 2019; Morphew, 2020). Innovations in research, engineering, and manufacturing will drive those solutions. Capturing that information, categorizing, and disseminating it across parallel lines of inquiry could speed that development (Anderson et al., 2018; Jahnke et al., 2018; Jurist et al., 2006).

Studies reviewed that used either qualitative or quantitative methods or a combination of both mostly concluded that organizations that take steps to improve their overall learning culture show better innovation potential in both efficiency and efficacy (Jiménez-Jiménez & Sanz-Valle, 2011; Ning & Li, 2018; Pérez-Luño et al., 2019; Planing, 2017). One study conducted by Pérez-Luño et al. (2019) built on the premise that an organization's long-term growth and success are tied to its ability to produce innovative products and services (Chen et al., 2016). Pérez-Luño et al. (2019) evaluated 181 survey responses from over 100 manufacturing firms considered to be innovative. Their study showed a positive correlation between an organization's ability to capture and disseminate both tacit and explicit knowledge and the firm's ability to innovate.

Innovation rarely occurs in a vacuum or results from a single individual working to solve a problem (Planing, 2017). Planing (2017) found that nearly all innovations occurred when "it was technically feasible to realize an idea, financially viable to do so, and when the early majority of the society was ready to adopt the idea" (p. 12). Joint problem-solving skills and practices are part and parcel of innovation. Joint problem-solving requires groups of individuals

to work together to solve a common problem (Ning & Li, 2018). This setting offers up an ideal environment for the exchange of knowledge. Ning and Li (2018) found that understanding and implementing a joint problem-solving strategy improves innovation in both efficacy and efficiency. They also noted that collaborative problem-solving skills allow organizations to acquire competitive capabilities and comprehend external knowledge.

Furthering the thoughts on innovation, Jiménez-Jiménez and Sanz-Valle (2011) drew strong connections between organizational learning, innovation, and performance. The findings of Jiménez-Jiménez and Sanz-Valle's (2011) study provided additional evidence to previous literature that innovation positively affects performance. Also, Jiménez-Jiménez and Sanz-Valle (2011) showed a positive relationship between companies with strong organizational learning cultures and performance and innovation. Jiménez-Jiménez and Sanz-Valle (2011) showed that the effect of culture on innovation is more robust than its effect on performance. This result may imply that organizational learning influences organizational performance mainly by facilitating innovation.

Learning Transfer

A generally accepted description of learning transfer is using previously held knowledge and skill in a new situation (Brion, 2022). Taken another way, it is the application of knowledge learned in one environment (such as a training seminar) and applied to actual events in the workplace. Organizations make substantial investments in employee learning and training every year, expecting that the new knowledge acquired will be applied to the current efforts resulting in improved performance (Liu & Zhong, 2018). Some studies have shown that very little learning gets transferred into the workplace (Cromwell & Kolb, 2004), and others have shown that the learning gets lost within a year (Salas et al., 2012).

Banerjee et al. (2016) conducted a study on academic staff and the knowledge gained through faculty development programs. They found that an organization's learning culture may lead to a better transfer of skills and knowledge from the classroom to the job. They further speculate that this can result in a significant return on the initial investment to establish and foster the development of the learning culture. Additionally, they posit that having a favorable learning culture should encourage members to share proprietary knowledge and engage in deeper collaboration (Banerjee et al., 2016).

In a similar study, Chang and Lin (2015) looked at a range of management individuals in private, public, government, and social sectors to the effects of learning culture on the learning transfer environment. Their findings indicated that individuals that perceive a flexible organizational learning culture recognize and contribute to overall learning transfer. It was also found that favorable learning cultures such as supervisor support, peer support, and coaching tend to be higher in these settings (Chang & Lin, 2015).

Turnover Intention

Turnover intention can be described as an individual's intention to change companies for whom they work voluntarily or to leave the labor market altogether (Mobley, 1977). Mobley (1977) developed a framework or decision-making process that an employee may go through in determining to leave their current position. Among the early steps in the process is the notion that the individual has experienced some sense of job dissatisfaction. That job dissatisfaction may stem from pay, ability to advance, or learning opportunities, to name a few. In this description, Mobley distinguishes between those choosing to change employers or leave the labor market and those who involuntarily leave due to lay-off or termination.

Lee-Kelley et al. (2007) argued that organizational learning was a faster-growing intervention in human resources development. Cho and Lewis (2011) noted that as the baby boomer generation nears retirement, the acquisition and retention of the subsequent generation's members will be critical to organizational success. But the relationship regarding turnover intention has not been explored extensively in the literature. This is due mainly to the timeframe between cause and effect. In this case, the creation and development of a learning culture could take longer to mature before the effects upon turnover intention are felt (Cohen et al., 2016).

Shore et al. (2006) found that individuals may become more reluctant to leave their organization when presented with sufficient and relevant training opportunities. Put another way, if employees' perception of the organization was such that they believed they had more access to training, learning opportunities, and openness in transmitting knowledge, their turnover intention decreased. Similarly, Karatepe et al. (2007) argued that actions such as job resources, management and leadership support, training, and empowerment over learning increased an employee's job satisfaction and lowered their overall turnover intention. Islam et al. (2013), Joo (2010), Joo and Park (2010), Paré and Tremblay (2007), and Song et al. (2011) made similar claims linking aspects of learning culture to lower turnover intention within organizations.

To counter these positions, Ngo-Henha (2017) reviewed prominent turnover intention theories or the generalization of reasons why people leave. Ngo-Henha (2017) argued that turnover leads to a loss of financial and social capital, harms employees' morale, and adversely affects the organization's reputation. However, none of the eight theories named and assessed included references to organizational learning or organizational learning culture as a cause or a mitigating factor of turnover intention. Similarly, Belete (2018) analyzed various factors for turnover intention and found none directly related to organizational learning culture. This would

imply that while organizational learning culture might be present in an organization with lower turnover intention, it is not necessarily the reason.

Challenges to Learning Culture

Organizational learning culture plays a role in enhancing adaptability and competitiveness. As organizations strive to stay ahead, developing a culture fostering continuous learning and disseminating knowledge becomes essential. However, achieving a thriving learning culture is not without its challenges. This section examines some obstacles that impede organizational learning culture's successful implementation and sustainment. Among the notable challenges are employee motivation and turnover. By delving into these challenges, this study aims to provide insights to understand better and address the complexities of nurturing a vibrant learning culture within organizations.

Motivation

"Motivation is an incentive, inducement, or motive, especially for an act" (Morris, 1970, p. 856). In other words, it is that thing that makes us act purposefully and specifically. In the context of a learning culture, those motivated to contribute to the culture see an outcome for the larger community worth striving for. Those that choose not to contribute or participate either lack the necessary motivation or are motivated to attain a different result (Mahmoud et al., 2021). Moustakas (2018) argued by noting that adult learners, in any setting, be it formal educational settings or informal workplace settings, will decide to participate in the learning process to fulfill a specific need.

Chadwick and Raver (2015) found that the motivation for organizational learning, and the culture that helps develop it, is based on the individual's perception of what they and the organization can ultimately gain or achieve. What initially starts as a question of individual

attainment grows into realizing higher-level accomplishment and the organizations' ability to move, not a single employee, but large groups of employees towards a common goal or achievement. Overcoming internal inertia becomes more difficult based on the organization's size (Bojkov & Goceva, 2020).

Malik and Danish (2020) found, however, that "organizational learning culture is significantly and positively related to the satisfaction, organizational commitment and job involvement but not with motivation to learn" (p. 2). This would indicate that while everyone in the organization may have different reasons for participation or non-participation, motivation to learn is not one of the determining factors.

Turnover

As discussed earlier, turnover intention, or the voluntary exit from a work environment, can be reduced as a benefit of a favorable learning culture (Cohen, 2016). The challenge that organizations face is the retention of individuals long enough to implement and build the culture and experience the results (Islam et al., 2013). Emami et al. (2012) noted that current factors facing all companies, such as economy, globalization, technology, and innovation, have significantly impacted how an organization continues to grow while at the same time retaining the knowledge and skills of its members within the organization.

Powell and Snellman (2004) provided foundational evidence suggesting knowledge generation and distribution are more important now than at any time in the past. Schultz and Schultz (1994) found that high job satisfaction was related to a person's positive attitude, which may lead to low intention to leave. Westlund and Hannon (2008) found that information technology (IT) professional retention has been increasingly challenging over the last few decades. Westlund and Hannon's conclusion was based on data from which we are 15 years

removed. Recent data from the Bureau of Labor Statistics (2023) would indicate that the trend has held steady and has not reversed or improved. This is significant because IT professionals make up a subsection of the aerospace community.

As Lyons and Bandura (2020) presented, there are several reasons why an individual voluntarily leaves an organization. Among them are poor working conditions, workload, stress, trust, unfair treatment, lack of support, compensation, benefits, and opportunities for advancement, to name a few. According to the Bureau of Labor Statistics (2023), in November 2022, there were 0.6 unemployed people for every open position in the United States. A ratio that suggests organizations with open positions are competing for a scarce resource. This, in turn, allows individuals to be more selective in their job choices and move to a new position when they experience some of those factors in their environment.

Organizational Learning in High Technology Settings

Most studies and papers reviewed for this research were confined to theoretical concepts. Of the few that did go beyond theoretical concepts, the focus was on high-technology settings, such as precision manufacturing or pharmaceuticals. This will have to stand as a sufficient analog for an aerospace study as there are few that focus on the aerospace industry itself. Of the few that concern aerospace, the focus is mainly on the National Aeronautics and Space Administration (NASA) and its ability to recover from failure or near-failure. The most glaring events in NASA's history include the Apollo 1 fire, the Apollo 13 accident, the loss of both the Challenger and Columbia space shuttles, Hubble Space Telescope mirror issues, and the Mars Climate Orbiter crash (Sauser et al., 2009). Holm et al. (2006) noted that positive or negative experiences can impact NASA's definition of lessons learned. The definition is like that of Argote and Miron-Spektor's organizational learning definition, "a change in the organization that

occurs as the organization acquires experience" (2011, p.1124), but lacks the note in a change of behavior of the organization. Lacking any discernible behavioral changes, these lessons learned become merely lessons observed.

Within an organization, few jobs can be done exclusively by one person. Just by being part of an organization, an individual belongs to a community of individuals, hopefully, engaged in similar pursuits. Pennington (2008) stated, "Complex environmental problem solving depends on cross-disciplinary collaboration among scientists" (p.1). The aerospace industry is not necessarily focused on environmental problems, but the sentiment is the same. Collaborative cultures among organizations can significantly influence the organization's learning ability and learning culture (Pérez López et al., 2004).

Pinto (2014) found that as deviant behavior in an organization continues to provide acceptable results to the organization but continues uncorrected, the organization will be faced with increasing amounts and variety of negative behavior that becomes increasingly difficult to correct and eventually unlearn. Pinto found that some organizations learn that behavior detrimental to an entity's objectives is accepted early and becomes acceptable over time because adverse outcomes are not realized or not observed in real time. Pinto cited Challenger and Columbia as examples of deviance. In the lexicon of NASA, it could be that the decision-makers understood the consequences of off-nominal conditions more intimately than those closest to the problems. While not explicitly described as deviant behavior in the CAIB, damage to tiles from foam insulation breaking away from the external tank was a problem that was observed on the first shuttle flight, STS-1 (NASA, 2003). The Columbia Accident Investigation findings documented that this risk was tracked over time. Still, since the damage never escalated to the point of concern, managers became comfortable accepting the risk and moving forward without a

solution (NASA, 2003). This position fell apart when tile damage from foam insulation resulted in the catastrophic loss of the crew and vehicle.

Rare events, such as the terrorist attacks of 9/11, the housing market crisis of the 2000s, or the savings and loan crisis of the late 1980s, offer significant learning opportunities but often may not impact specific individuals directly. Thus, the masses view them with train-wreck fascination but are not critically examined to determine how an organization can learn from them (Garud et al., 2011). NASA has had its share of rare events, including the Apollo 1 fire, Skylab, Challenger, Hubble, Mars Climate Orbiter, and Columbia (Hogeback, 2021). This number of rare events might indicate that rare is more common than initially considered. The root cause(s) are examined and routinely publicized for other projects/programs to learn from. But what is lacking is the successful data from other missions that should be passed along but are not (Sauser et al., 2009).

Systems to Promote Organizational Learning and Develop Culture

As stated earlier, several mechanisms have been developed over time to assist in sharing knowledge, either within an organization or through sources external to an organization. Two examples of the more prevalent concepts or systems used in the aerospace industry follow. Communities of practice and lessons learned systems are mechanisms for sharing information, improving skills, and advancing general knowledge in a domain (Helm, 2007). This is not intended to be an exhaustive list but rather a sample of the types of systems common in the aerospace industry.

Communities of Practice

Wenger and Snyder (2000) characterized communities of practice as self-organizing, self-directing, informal, and self-selecting of members. Wegner and Snyder defined communities of

practice as "a group of people informally bound together by shared expertise and passion for a joint enterprise. People in a community of practice share their learning experiences in free-flowing, creative ways that foster new approaches to problems" (2000, p. 139-140).

Serrat (2017) attributed four attributes to communities of practice: peer-to-peer collaborative networks, their members are willing participants, they are focused on learning and building knowledge capacity, and they are engaged in sharing knowledge, developing expertise, and solving problems. These have become less informal and more structured in some organizations, with significant management and leadership intervention. A community of practice could be created by an organization with the sole purpose of solving a particular problem (Pattinson et al., 2016).

A community of practice, in some organizations, can be a standing entity with a membership that rotates in and out after a specific duration (Pyrko et al., 2017). They can be used as a mechanism for continual problem solving, a grey beards panel. Or they could be a short-duration entity intending to define or resolve a specific issue (McLoughlin et al., 2018). However they are used, as Wegner and Snyder (2000) noted, the intent is to share their learned experiences.

Lessons Learned

Garud et al. (2011), Lampel et al. (2009), and Starbuck (2017), present cases for sustaining a lessons-learned culture where experience is documented and an attempt is made to integrate necessary behavioral changes into the ordinary course of business. Rowe and Sikes (2006) made the case for two essential qualities of a successful lessons-learned system. The first is capturing new lessons learned and assessing current performance against existing lessons learned begins at the initiation of a new project and the project management team projects that

emphasis on its importance. Second, the organization's senior management is committed to the process and emphasizes best practices to ensure its implementation.

The Project Management Institute (PMI) Body of Knowledge (PMBOK) defined lessons learned as "the learning gained from the process of performing the project" (PMBOK, 2013, p. 544). Lessons learned intend to promote the recurrence of desirable outcomes and preclude the recurrence of undesirable consequences. Thus, a lesson learned may not just be focused on a failure; it could result from a process change recognizing increased efficiency.

A 2001 study of NASA's lessons-learned initiative found that just 25% of NASA managers contributed lessons learned to the system, and another 25% of managers were unaware that the system existed (NASA, 2001). Worse still, in the five years from 2015 through May 2019, only 51 lessons learned were submitted and approved as official lessons learned (NASA, n.d.). Apart from lessons learned, NASA's knowledge management activities have since been studied to some degree. Hoffman and Boyle (2013), Liebowitz (2002), Martin (2012), Paxton (2006), and Topousis et al. (2012) have written on the subject and provided a positive overview and outlook for NASA's activities and emphasis on knowledge management.

Summary

An organizational learning culture is created in a place where individuals are provided with the tools and the opportunities to learn (Örtenblad, 2004) and are encouraged to achieve organizational goals (Shin et al., 2017). Defining and recognizing the attributes of organizational learning and a learning organization are critical components to developing an organizational learning culture that will grow within an organization and contribute to improved performance, innovation, and long-term success.

The literature review presented here focused on five topics. They include (1) the learning organization, organizational learning, and organizational learning culture; (2) the benefits of an organizational learning culture; (3) the challenges of an organizational learning culture; (4) Organizational learning in high technology settings; and (5) systems to promote organizational learning and develop culture. Örtenblad (2018) distilled 30 years of attempts to define a learning organization into three categories; one where the organization facilitates learning; one where the organization is an actual learning unit; and one where the organization is the product of learning by its members. Despite the lack of agreement on a single definition, most definitions use Senge's (1990) as a point of departure for their work.

Once defined, an organization can focus on the benefits attributable to a positive learning culture that can create the conditions for improvement. Benefits such as increased innovation, increased knowledge transfer, and reduced turnover intention help to sustain and encourage growth within the organization. To develop those conditions, organizations will need to look to overcome the challenges that impede the progress toward a positive organizational learning culture. Challenges such as employee motivation and turnover prevent an organization from establishing and retaining the cultural conditions that lead to growth.

Škerlavaj et al. (2007) noted that literature lacks empirical investigation into organizational learning culture, and this is particularly true when applied with specificity to the aerospace industry. Regardless of how one defines a learning organization, it cannot exist without participation and sustainment from all levels of the organization (Weldy & Gillis, 2010). Weldy and Gillis (2010) found that it was not sufficient to establish the environment for learning to occur but that all participants must be actively engaged in the processes that enable and sustain learning.

This literature review sought to define organizational learning culture, understand the benefits of and challenges to developing an organizational learning culture, organizational learning in high technology settings, and some of the systems used in its sustainment. While the aerospace industry is separate and distinct from other industries, at its core are adults attempting to learn and improve their particular products or services and, as such, face some of the same conditions common to any industry. While this review concludes that further industry assessment would be beneficial, much can still be learned from similar but different industries.

CHAPTER 3: METHODOLOGY

This qualitative phenomenological study sought to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Pantouvakis and Bouranta (2017) described an organizational learning culture as one that encourages employees to refresh and increase their individual knowledge, seek to become skilled in new technologies, and expand their capabilities following environmental change. This description builds on Škerlavaj et al. (2007) definition of an organizational learning culture, "a set of norms and values about the functioning of an organization" (p. 347). Škerlavaj et al. (2007) definition built on Marsick and Watkin's (2003) contention that culture is established by an organization's leadership and critical stakeholders who possess the ability to learn from their and others' experiences, can influence learning throughout an organization and can create an environment that identifies, supports, and rewards efforts that model desired results.

Watkins and Marsick (1996, 2003) identified seven dimensions of organizational learning culture across an entity's individual, group, and organizational levels. These dimensions, or interdependent action imperatives, characterize organizations attempting to strengthen their position as a learning organization. According to Watkins and Marsick (1996), an organization should (1) establish an environment that continuously supports learning; (2) promote inquiry and dialogue among its members; (3) encourage collaboration and team learning; (4) create or provides a system for capturing and sharing knowledge; (5) create a collective vision; (6) connect the organization to its external environment; and (7) have leadership that provides strategic support for learning.

This study, grounded in Knowles' (1968) adult learning theory, sought to answer the following research questions:

Research Question 1: How do aerospace industry professionals describe organizational learning culture?

Research Question 2: How do aerospace industry professionals perceive benefits associated with organizational learning culture?

Research Question 3: How do aerospace industry professionals perceive challenges associated with organizational learning culture?

This study took the form of a qualitative phenomenological study. Within a qualitative study, the researcher looks for patterns and commonalities within a lived human experience (Bloomberg & Volpe, 2018). A phenomenological approach further looks to understand the foundational structure or essence of that experience by examining individuals having experienced that phenomenon (Thorne, 2000). In this study, the researcher aimed to understand organizational learning culture and its benefits and challenges as perceived by those in the aerospace industry. Data were gathered through structured, written interviews collected from participants based upon Watkins and Marsick's (1996) Dimensions of Learning Organization Questionnaire (DLOQ). The authors expressly permitted the use of the DLOQ (Watkins & O'Neil, 2013); permission was also explicitly granted for this study (Appendix A). In this study, the researcher offered the participants the opportunity to reflect on their own experiences with organizational learning cultures to which they've been exposed.

The DLOQ consists of 21 questions that are broken out into groups of questions that are targeted at the individual level, group or team level and the organizational level. This study made particular use of the three questions specifically designed for the group or team level, as well as one question from the individual level and two from the organizational level that the researcher believes impact group or team-level learning. This made for a total of nine questions

directed explicitly at organizational learning culture. The selection of group or team-level questions was chosen for several reasons. First, to keep the length of the written interview reasonable while gathering as much data as possible. The second reason was as a means to begin to fill the gap in the literature where the group or team level has not had as much examination as the individual or organization level. A tenth question was added for general thoughts.

Site Information and Demographics

Potential participants for this study were individuals working in the aerospace industry. As of August 2020, there were nearly 18,000 civil servants across multiple NASA centers (WICN, 2020). Including contractor support, that number, by some estimates, may increase by another 60,000 employees (Employee Orientation, 2021). It should be recognized that industry estimates suggest there are over 500,000 individuals in the United States supporting the aerospace field in one form or another (Aerospace Industry Spotlight, 2021).

With over 500,000 potential participants, there wasn't a single venue or organization where all could be reached, and all shared a common experience. However, as in some professions, participants self-select into professional organizations (Matthews, 2012). Typically, these organizations exist for the sharing of knowledge, maintenance, and upkeep of skills and abilities, and the dissemination of best practices (Matthews, 2012). One such organization is the American Institute for Aeronautics and Astronautics (AIAA), an organization dedicated to aeronautics and astronautics and a rational organization to seek out members of the aerospace industry (About AIAA, 2022). AIAA advertises a membership of over 30,000 individuals that come from a variety of backgrounds and disciplines (About AIAA, 2022).

Participants and Sampling Method

This study used a combination of purposive sampling and voluntary response sampling. Purposive sampling employs the deliberate choice of participants due to the qualities that the participant possesses (Tongco, 2007). In this study, the researcher asked participants to self-identify as having specific experience in the aerospace industry. For this study, specific experience was defined as currently or formerly employed by a private company, a federal agency, academia, or a non-profit organization for the design, development, test, evaluation, manufacture, operation, and/or disposal of components, systems, or vehicles intended for an aerospace environment. Participation was not limited by discipline; any individual meeting the above criteria was eligible to participate regardless of education, years of experience, or functional domain within their organization.

Instrumentation and Data Collection

This study began with a recruitment flier (Appendix B) posted on the AIAA Engage electronic bulletin board. As mentioned previously, AIAA has nearly 30,000 members and is the self-declared largest technical society dedicated to the aerospace profession (About AIAA, 2022). The bulletin board post remained active for two weeks. If the minimum of 10 participants was not reached in two weeks, the recruitment flier was reposted every two weeks until the minimum threshold of 10 participants was reached. The posting requested that individuals who self-identify as meeting the participant criteria and are interested in participating download the Participant Information Sheet (Appendix C), which was attached to the posting, which details the study's purpose, methods used for data collection, information regarding confidentiality protocols, an explanation of any associated risk or benefit to the participants. The link to a Google Forms containing the written interview questions was also provided in the

Participant Information Sheet to ensure that participants reviewed and assessed the purpose, risks, and benefits of the study.

Structured, written interviews that should take approximately 60 minutes were conducted via Google Forms with 11 participants. The structured interview questions (Appendix D) were developed consisting of nine questions adapted from the Dimensions of the Learning Organization Questionnaire (DLOQ) as initially established by Marsick and Watkins (1996) and further refined by Watkins and Marsick (2003). Permission was granted by the instrument authors (Appendix A) to use the DLOQ survey questions as the basis for the open-ended structured interview questions.

On the Google Form, a summary of the Participant Information Sheet was presented again. It included the researcher's name, the study's purpose, estimated time commitment, potential risks and benefits, confidentiality measures, and the researcher's contact information. Participants were asked not to provide personally identifying information such as names, email addresses, or employers as part of their responses. If, in the review of a participant's response, such identifiable information was discovered, all information regarding that participant, including all response material, was deidentified. The data and the substance of such a response were retained.

Participants were informed that their identity would remain anonymous as Google Forms does not provide the IP address of the respondent, and the researcher could not obtain that specific information. This also means that the researcher could not contact the participant for additional information if the initial response were vague, incomplete, or missing. In a situation where a question had not been answered and left blank, the entire response was eliminated from consideration unless the participant indicated that they did not wish to respond to a particular

question, as could be the case in a verbal interview. Participants were advised that if they did not respond to a specific question, a response such as “prefer not to answer” would indicate that they had read, assessed, and chose not to respond for a reason. For vague or incomplete information, the researcher used their best judgment to determine if it was sufficient to constitute a complete response. If not, it was eliminated from consideration.

Google Forms is an application associated with Google Drive and is available to Google account holders. When participants completed the written interview using Google Forms, data from the interview was stored on Google servers and was only accessible by the original account holder, in this case, the researcher. Responses from the written interview were viewed in Google Sheets, another application in the Google Drive suite of applications. Access to both Google Forms and Google Sheets was limited to only the researcher through two-factor authentication. Data collected for this study, including all electronic interview records, notes, and journals, will be maintained securely on a password-protected computer accessible only to the researcher and destroyed after three years.

Member checking is "a process in which the researcher asks one or more participants in the study to check the accuracy of the account" (Creswell & Guetterman, 2019). In a verbal interview, member checking might be employed by having the participants review the findings for accuracy and completeness, where transcription of the interview may have been incomplete or inaccurate. The research did not use member checking as the participant's identity and contact information were anonymous to the researcher. With a written response, the data provided by the participants was of their voice and by their own hands. The researcher was not burdened by translating verbal interviews into written transcripts and, with it, the inherent risk of mistakes.

The research lacked the ability to contact the participant to ask for clarification, intent, or additional information that might fully round out a response.

Data Analysis

Data analysis among qualitative studies, as Thorne (2000) observed, "is the most complex and mysterious of all of the phases of a qualitative project" (p. 68). The rationale is that the research must rely on inductive reasoning to draw connections and conclusions from disparate data sets (Thorne, 2000). Researchers engaged in qualitative studies are interested in how the participants of a particular phenomenon think and feel about the subject without applying judgment toward those thoughts and feelings (Thorne, 2000). Creswell and Guetterman (2019) offer a five-step framework for conducting this analysis which was used in assesses in the participant responses:

1. *Prepare and organize the data*. Interview responses from Google Forms were prepared in a Google Sheets file and stored in the same account as the Google Form. One Google Sheet file will be created as a single file to collect all responses. Each participant's responses were recorded in a unique column (vertically), and common questions will be matched in rows (horizontally).
2. *Review the data and identify emerging ideas*. Individual participant responses were broken down into discrete elements by question. These elements will be evaluated for significance and thoroughness.
3. *Label each emerging idea with a code*. Significant thoughts or ideas were manually assigned a unique code to be compared across all transcripts.
4. *Develop and assessment of the themes*. Significant ideas common across multiple participant responses were separated as emergent themes.

5. *Represent the themes through descriptive or visual means.* Themes were explored for further exposition and tied to existing literature or the absence thereof.

Data from the structured written interviews were manually coded and analyzed to identify themes. As Saldaña (2016) acknowledged, coding is merely one way of analyzing data but not the only way. In essence, Saldaña (2016) describes a code used in a qualitative study as a word or phrase that provides a summative attribute to a series of language-based or visual data. That is to say, a short description of a more extended passage of words or visual information is provided in support of an idea. The code does not replace the data but acts as a collection point or pointer to a broader description of thoughts and ideas.

To that end, the researcher reviewed individual written interview responses for particular codes and then compared all interview responses for similar codes, competing codes, and/or contradictory codes. Emerging codes and themes in participant responses were grouped into related sections for comparison. Repetitive analysis of the written interview data ensured a concise and thorough evaluation of material for relevant and meaningful codes (Creswell, 2015; Merriam & Bierema, 2014). Codes that emerge as dominant across multiple responses were codified into overarching themes. Codes that emerge as antithetical or contradictory were assessed for competing meanings.

Limitations, Delimitations, and Ethical Issues

The following are limitations, delimitations, and ethical issues potentially impacting this research study. Limitations are potential study weaknesses that are usually out of the researcher's control and are closely associated with the research design (Theofanidis & Fountouki, 2019). Similarly, delimitations are limitations that the researcher purposely set or established. These concern how the research chose to bound the study so that the study's aims

and objectives do not spiral out of control and remain possible to achieve (Theofanidis & Fountouki, 2019). Finally, Creswell and Poth (2018) describe ethical issues as the complex matters the researcher must consider and address from the outset through the duration of the research.

Limitations

Limitations are inherent to studies, and the scope of all research projects can be identified as potential weaknesses of the study (Bloomberg & Volpe, 2018). Bloomberg and Volpe (2018) described limitations as conditions that are external to the study that restricts or constrain the scope, and that may affect the study's outcome. Identifying and addressing the potential means to mitigate these limitations is essential to ensure accuracy and provide confidence that the researcher has considered potential problems that may occur throughout the duration of the study (Bloomberg & Volpe, 2018).

A potential limitation was researcher bias, or any unintended errors in the research process or the interpretation of its results that are attributable to an investigator's expectancies or preconceived beliefs (VandenBos, 2015). Bracketing, or the intentional putting aside of one's knowledge and experience with a phenomenon (Chan et al., 2016), was used by the researcher during the data collection and analysis phases to mitigate this limitation.

Another potential limitation of the study was the number of willing participants. With such a large population available, a limitation on the number of participants interviewed reduced the ability of the researcher to gain a comprehensive understanding of the lived experiences of a large, representative sample. The participants in the study might have had similar backgrounds. For example, all participants could work for the same employer. While the odds are slim, this

would have the effect of recording the experience within one segment instead of a view across the industry.

An additional limitation of an anonymous interview was the researcher's inability to verify that participants met the established qualifications independently. While the researcher sought insights provided by members of the aerospace industry, the very nature of an anonymous interview relies on the honesty of the participant. The researcher mitigated this limitation by only posting requests for participation through the AIAA Engage electronic bulletin board and requesting that participants not share links to the study interview.

In an anonymously written interview, the researcher could not assess the participant's mannerisms during response. For example, the research could not judge the tone of voice, inflection, or body language that might lend further nuance to the reaction. This was mitigated by the fact that an audio-only interview would face some of the same limitations.

Finally, the study was limited by the absence of member checking. As noted earlier, the member-checking process is used when the researcher verifies the accuracy of an account by returning it to the original participant (Creswell & Guetterman, 2019). In this study, participant responses were anonymous; therefore, the researcher could not contact any participant. Member checking is "a process in which the researcher asks one or more participants in the study to check the accuracy of the account" (Creswell & Guetterman, 2019, p. 261).

Delimitations

As stated earlier, delimitations are limitations that the researcher purposely set or established. These concern how the research chose to bound the study so that the study's aims and objectives do not spiral out of control and remain possible to achieve (Theofanidis & Fountouki, 2019). Delimitations of this study were few, but included the site.

The site of this study was the aerospace industry, and participants were solicited from the professional organization AIAA that individuals willingly chose to join. The number of participants, which was anticipated to be 10 participants, was relatively small in comparison to the larger population of the industry, which industry estimates suggest there are over 500,000 individuals in the United States supporting the aerospace field in one form or another (Aerospace Industry Spotlight, 2021). The responses may not be reflective of all the practitioners in the aerospace industry.

By creating an anonymous survey, there was no opportunity for member checking (Creswell & Guetterman, 2019) to ensure the accuracy of interpretation. This served as an additional delimitation as the researcher specifically took this step to ensure that participants remain anonymous and are motivated to provide the fullest, most honest response possible without fear of reprisal.

Ethical Issues

The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1978), the Belmont Report, summarizes the basic ethical principles that outline the protection of human subjects. This resulted from the National Research Act, signed into law in 1974, which created a commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The three principles include respect for persons, beneficence, and justice. In respecting persons, each participant was provided with a Participant Information Sheet that outlines the purposes of the study, the potential participant pool, and the risks and benefits of participation. Beneficence of the study is to do no harm to the participants and maximize benefits (Office for Human Research Protections, 2021). Finally, justice relates to a sense of fairness (Office for Human Research Protections, 2021). As all participants were self-

selected or participated voluntarily in the study, no specific subgroup was intentionally targeted or eliminated from participation.

Trustworthiness

Bloomberg and Volpe noted that criteria for evaluating the trustworthiness of qualitative research focuses on "how well the researcher has provided evidence that her or his descriptions and analysis represent the reality of the situations and persons studied" (2018, p. 162). This representation is buoyed by four qualities, credibility, transferability, dependability, and confirmability. Each of these qualities will be defined and described in the following sections.

Credibility

Credibility refers to "whether the participant's perceptions match the researcher's portrayal of them" (Bloomberg & Volpe, 2018, p. 162). To ensure credibility in this study, a three-step approach was used. First, the researcher used a standard instrument, the Dimensions of Learning Organization Questionnaire, as the basis for the written interview questions. Second, sampling was voluntary among a known population of participants; thus, the research did not target a specific participant for inclusion in the study, nor did the researcher exclude a particular participant that meets the selection criteria. Third, data were collected and managed systematically, as previously described.

Transferability

Bloomberg and Volpe (2018) noted that a qualitative research study is not necessarily generalizable to other similar settings. The researcher understood that to be the case with this study as well. Kim et al. (2015) documented 76 instances between 2000 and 2015 where the DLOQ was used as a basis of research in both quantitative and qualitative studies. These studies, however, did not include a specific study of the aerospace industry. While this study may not be

generalizable to other studies, it may allow for comparison by other researchers conducting qualitative studies of the same topic in the same or different industries. To promote transferability, the research provided an accurate representation of all data collected and a detailed description of how data is collected and evaluated.

Dependability

Dependability within a qualitative study is often difficult to ensure (Bloomberg & Volpe, 2018). Bloomberg and Volpe (2018) observed that dependability "refers to whether one can adequately tackle the processes and procedures used to collect and interpret the data" (p. 204). To ensure dependability, the researcher used structured, written interviews. Finally, the researcher consistently used Creswell and Poth's (2018) five-step data analysis process.

Yin (as cited in Smith et al., 2009) proposed that validity (or dependability) can be established through the creation of a "chain of evidence that leads from initial documentation through to the final report" (p. 183). Therefore, the researcher maintains a chain of evidence that begins with the initial proposal through documentation of the process, data collection, analysis, and documentation of findings.

Confirmability

Korstjens and Moser (2018) noted that confirmability ensures that a researcher's biases and viewpoints do not unduly influence the interpretation of the data collected. Creswell and Poth (2018) indicated that an audit trail could be used to add to a study's confirmability. Keeping these thoughts in mind, the researcher addressed confirmability by maintaining and storing data and documenting the process used to analyze the data so that another researcher could replicate the approach used throughout the research study.

Chan et al. (2015) described bracketing as deliberately putting aside one's knowledge and experience with a phenomenon before and during the research. This is done so the researcher does not influence a participant's understanding of the phenomenon. The researcher will attempt to bracket their knowledge and understanding of the phenomenon to allow the participants' responses and inputs to stand apart for analysis.

Summary

This qualitative study used a phenomenological research design. This allowed the researcher to investigate the phenomenon of learning culture perceptions among individuals that work in the aerospace industry. Data was collected and analyzed using a rich, descriptive focus. A recruitment flier was shared with members of the American Institute of Aeronautics and Astronautics (AIAA) through the Engage electronic bulletin, and those interested participants who self-identify as meeting the criteria on the recruitment flier were asked to participate in a structured, written interview. Interview data were collected, evaluated, and analyzed for participant perceptions of learning organization attributes in the aerospace industry.

A detailed description of this study's planned methodology was provided in this chapter. This study begins to fill the existing void in research on the perception of organizational learning culture in the aerospace industry. Credibility, transferability, and confirmability will be attended to using a validated instrument, detailed description, and a coherent audit trail. The researcher took all necessary precautions to conduct this human participant study ethically while protecting the research site, participants' identity, and the data provided. Every effort will be made to address ethical issues or conflicts of interest.

CHAPTER 4: RESULTS

The purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Humankind's earliest successful attempt at power flight culminated with the Wright brothers' 12-second, 120-foot excursion in 1903 (Pritchard, 1954). Just as recently as 2022, NASA launched an uncrewed Artemis 1 vehicle on a 25-day, 1.4-million-mile journey around the moon and back. The International Space Station has remained continuously crewed since November 2, 2000, orbiting the Earth every 90 minutes, traveling 26,500 miles every orbit (58 million miles total). In the 120 years since the first powered flight, humans have achieved incredible advances in the technology, engineering, and science of aerospace design and operation. These advances were not achieved in a vacuum (Planing, 2017) and resulted from an organizational learning culture in place or created that allowed them to occur.

Eleven participants provided written responses to specific questions (Appendix D). The 11 interview responses provided 105 total answers, each of varying degrees of specificity. No names or identifying information were collected, but each participant was assigned a pseudonym. The following questions were used to focus on the phenomenon of organizational learning culture in the aerospace industry:

Research Question 1: How do aerospace industry professionals describe organizational learning culture?

Research Question 2: How do aerospace industry professionals perceive benefits associated with organizational learning culture?

Research Question 3: How do aerospace industry professionals perceive challenges associated with organizational learning culture?

After receiving the University of New England (UNE) Institutional Review Board (IRB) exempt approval (Appendix E), a Google Forms document was created to collect participant responses. During the creation of the Google Form, all privacy settings were reviewed to ensure that there would be no information collected besides the responses to the questions. Settings that would collect additional data, such as email addresses or Internet Protocol (IP) addresses, were turned off. Once the form was completed, the researcher conducted a test run of the Google Form to ensure that responses would be captured accurately. When the responses were verified as having been captured correctly, they were removed from the history, and the Google Form was deemed ready to go live.

When the Google Form had been verified as operational, the recruitment flyer, participant information sheet, and interview questions were posted on three different boards within the American Institute of Aeronautics and Astronautics (AIAA) Engage electronic bulletin board system. These boards were the "Open Forum," which is available to all AIAA members; the "Region IV – South Central," which is a subset of the Open Forum and is available to people that register as living in a specific region; and the "Houston Section" which is a further subset of the Region IV. While it may seem duplicative, as members of the Houston Section are also members of the Open Forum, the researcher believed in posting in as many places as possible to capture at least 10 participants.

Following the recruitment protocol, the postings were left up for two weeks, with the recruitment flier reposted every other day during that time. As with all electronic bulletin boards, new postings push older postings further down on an individual's feeds. By reposting or re-upping, the recruitment flier would generally be at the top of all user's feeds in each of the three boards where it was posted. After the first two weeks of availability, the three posts had

received roughly 7000 impressions. An impression is counted as the number of times a user sees a post. The user may not physically click on a link or interact with the post in any meaningful way, but the impression counts the number of times it was seen. One participant's response was recorded on the Google Form during this period.

Having not met the minimum number of interview question submissions threshold, the researcher submitted an IRB amendment which revised the research proposal to include posting the recruitment flier on the researcher's personal LinkedIn page and several aerospace-centric LinkedIn group pages. This request was approved (Appendix F), and the original flier was posted on the researcher's page and the Aviation & Aerospace Professionals, Aerospace Professionals, Defense and Aerospace Connections, and Aerospace & Security & Defence Technology and Business pages. Two weeks of posts and several reposts generated an additional 10 participant responses, bringing the total to 11 participant responses, one more than the minimum threshold. At this point, the Google Form was taken offline to prevent any additional responses during the analysis phase.

The next step involved coding. Coleman and Ringrose (2013) noted that the coding process entails looking for patterns or order in data sets through identified themes, categories, or concepts. The concise and direct responses to questions led the researcher to annotate the responses manually. The purpose was to separate and categorize segments of responses to help make sense of the experiences of the participants (Creswell & Poth, 2018). In doing so, the researcher read, reviewed, and removed irrelevant information to create a clear statement or set of statements by the participants. Finally, the researcher then identified emergent themes and used evidence from the participant's responses to help describe the participants' lived experiences in the study.

This chapter contains three major areas. First, there is a summary of the study reiterating the purpose, research questions, and a review of the methodology used. The following section contains an analysis of the participant's responses to the posted questions. This section also contains basic demographic information on each participant to contextualize their responses better. Finally, the last section describes the emergent themes identified during the coding process. These themes include (1) the importance of open communication, (2) the importance of transparency in the decision-making process, and (3) the importance of establishing, building and maintaining trust among and across the members of the organization.

Analysis Method

Once the researcher had confirmed that the 11 participants' interview question responses were completed and all interview questions answered, the participant responses were downloaded from Google Forms to the researcher's personal computer and stored in a Microsoft (MS) Excel workbook. Within the Excel workbook, each participant was assigned a pseudonym for identification purposes, and each question was held on a separate sheet so that all the responses to a single question could be reviewed at a time. All responses were reviewed to ensure that no identifying information was included as part of the response.

The data was organized in an Excel spreadsheet with all responses to each question on a single worksheet. This allowed the researcher to examine all the responses to a single question while maintaining access to the participant's demographic characteristics. The researcher began the manual coding process, proceeding line by line through each response. The researcher assigned a phrase or idea that "describes the meaning of the text segments" (Creswell & Guetterman, 2019, p. 244). Participant responses with more significant volumes of text generated more codes maintained on the same spreadsheet as the responses. When each

response worksheet had been coded, the researcher combined all the codes from all the responses and reviewed them for overlapping phrases or ideas. These overlapping phrases or ideas began the construction of fundamental themes that reflected the overall meaning of the responses. The researcher then examined the primary themes to determine how they connected to the first research question.

A subsequent assessment was done of all the responses to gauge the tone of the response as either generally positive, neutral, or generally negative. Since the second and third research questions deal primarily with benefits and challenges, the researcher looked at the positive responses to determine if any benefits were referenced or alluded to. With the generally negative comments, the researcher looked for those indications of challenges or barriers being described.

With the coding and assessment completed, three primary themes emerged: (1) the importance of open communication, (2) the importance of transparency in the decision-making process, and (3) the importance of establishing, building, and maintaining trust among and across the members of the organization. Since this study was purposefully designed to be anonymous, the researcher did not have the opportunity to validate the emergent themes with the participants.

Presentation of Results and Findings

The purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Qualitative research studies tell a story, and the researcher is the narrator of the story (Bloomberg & Volpe, 2018). In this case, the researcher's (or narrator's) source material comes from the lived experiences of the participants in the study. The participant's experiences form the basis of and represent a generalization of a more significant population within their cohort (Bloomberg & Volpe, 2018). This section contains an analysis of the participant's responses to the interview

questions. The first section contains basic demographic information on each participant to contextualize their responses better. The second section, listed as interview question responses, provides answers, anecdotes, and detailed descriptions of the participants' experiences related to the interview questions. Finally, after the coding process was conducted, emergent themes were identified and outlined using participant responses and existing literature on the subject to help the reader understand the combined experiences of the participants.

Participant Demographics

For the reader to understand the participants and the context in which their responses are couched, Table 1 summarizes the primary demographic data collected at the start of the survey. This information includes in which part of the aerospace industry they participated (government, industry, academia, non-profit, or other), in what capacity they would describe their participation (management, non-management/technical, non-management/non-technical), and for how many years they have been involved in the aerospace industry. Most of the participants (eight) identified as having experience coming from industry, two from government, and one from academia. Seven participants described their roles as non-management and technical, while the remaining four described their roles as managerial. Finally, the participants ranged in experience from six to 46 years.

Table 1

Primary demographic data of study participants.

Participant	In what area of aerospace would you characterize your experience?	Within your organization, what best describes your role?	How many years have you spent in the industry?
Sam	Industry	Non-management, technical	13
Diane	Industry	Management	46
Norm	Industry	Non-management, technical	15
Carla	Industry	Non-management, technical	18
Cliff	Industry	Non-management, technical	27
Ernie	Industry	Non-management, technical	27
Woody	Academia	Non-management, technical	44
Rebecca	Industry	Management	26
Robin	Government	Management	6
Evan	Industry	Non-management, technical	25
Mjr Kong	Government	Management	31

Interview Question Responses

Using a subset of questions from Watkins and Marsick's (1996) Dimensions of Learning Questionnaire as the basis for this study, participants were asked about different strategies that organizations can use to build a culture of learning at the group and organizational levels. Six questions were directed at group or team-level learning, and the remaining three were at organizational-level learning. The nature of the interview questions allowed the participants to share as much or as little of their experience as they desired. Of the nine specific experience questions and one general anything else to add question, there were only four instances where a participant expressed a desire not to answer the question. Participants were advised that if they chose not to answer a question and left the response field blank, the entire interview would be removed from the study. They were further advised that if they did not respond to a specific question, a response such as "prefer not to answer" would indicate that they had read, assessed, and chose not to respond for a reason.

Group-Level Trust Building

The first interview question asked the participants to reflect on their experiences where the organization purposefully allowed members to build trust with one another. Except for Major Kong, all the participants provided a neutral or negative response to the question. Major Kong, with a background in military aviation, cited the "plan-brief-execute-reconstruct-debrief" together with a "no-rank" culture as a mechanism for breeding trust. Major Kong further explained that the point of these exercises was to focus on improving as an individual and a team.

On the other hand, in private industry, where most of the participants came from, the same imperative does not exist, according to the participants. Participants generally had negative responses regarding their organization's efforts to build trust within the organization. Ernie succinctly stated, "People don't trust, and, in most organizations, it's divided and segmented, like a school ground." Ernie indicates trust is not an attribute of great importance in their organization.

While Ernie did present one view of trust building within the organization, other participants were more nuanced in their explanations while still maintaining that little, if any, effort is taken to build trust. Sam noted that trust is built despite the lack of effort by the organization and primarily through day-to-day interactions. Carla echoed this sentiment, stating:

> Trust is one of those qualities that you either have it or you do not. You can go through all the same team-building courses and seminars, but if one person on the team breaks trust or does something that is perceived as underhanded, cutting corners, or just plain disruptive, any trust takes a huge hit.

Evan observed a similar state in his organization, stating simply, "My org does not really do this. The expectation is that trust will be built by virtue of having worked together."

Norm, noting a similar lack of mechanisms, indicated that his organization relied on its members completing training in specific disciplines, that an individual has completed training means the individual can be trusted to be competent in the task. A common sentiment among most participants was that while trust was important, it was not actively cultivated by the organization and left to the members to create. Diane maintained a similar perspective noting the use of on-the-job training as a means for building relationships and trust.

What stands out in the participant responses was the belief that the state of activities or mechanisms an organization can use to build trust has decreased over time. Two participants, Cliff (27 years experience) and Woody (44 years experience) indicated that their organizations had taken time and actions to build trust early in their careers. Woody noted the use of retreats where employees were removed from the workplace to focus on a specific problem or issue without the daily distractions common to the office environment. Woody also noted the use of potluck lunches to get individuals out of their office or cube and share a common meal. Cliff attributed the devolution to management's focus on bottom-line costs:

> In my experience, management is now more focused on getting the most work done with the least amount of added cost to realize the greatest possible profit. Any incidental activities that do not contribute to the successful completion of the mission or the task at hand are downgraded and eventually eliminated.

Adapting Goals

The second question asked in the survey had the participants reflect on their experiences concerning the organization allowing the group or team the freedom to adjust their goals. As

with the first question, except for Major Kong, all the participants responded with a neutral or negative response. Keeping in mind a military background, Major Kong offered that their experience resulted from an environment with "frequent touch points with senior leaders" and "early communication for not meeting goals." In combining the acts of frequent opportunities for communication and alertness at early stages when goals may not be met due to environmental reasons outside of the organization's control, the group or team generally was allowed to influence either the direction of progress toward a goal or the end goal itself. What was not specified by Major Kong's response was the ability of the group or team to change their goal unilaterally. While they were afforded the opportunity of open and early communication with senior leadership, goal-changing in a military environment is done in coordination and with the approval of that same leadership.

With a completely different perspective, Carla, Cliff, Ernie, and Woody were most explicit in their assessment of the organization's willingness to allow groups or teams the freedom to change goals. With responses such as "This is a non-starter," "We do not have the freedom," "Never," and "Team goals don't get adapted by the individual. Just doesn't happen," provided respectively, the four paint a striking contrast to Major Kong. What becomes evident is the nature of the hierarchy in their aerospace industry sector (three from industry and one from academia), which is that goals are established at a high level and pushed down through the organization. At the individual level, altered goals may not have much of an impact at the organizational level. Still, team or group-altered goals could significantly delay or put at risk organizational-level goals.

The remaining participants, again, provided a more nuanced take on their observations. Sam noted a difference in how the question gets answered depending on where your organization sits.

The government organization that contracts out work, the prime contractor responsible for completing that work, and subcontractors they may use to complete the work all have different levels of influence, with subcontractors having the least. Evan alluded to this dynamic when stating, "Goals and objectives get adjusted in the near-term based on funding levels on the contract and the needs of other groups." Norm indicated a willingness by the organization to allow for the adaption of goals "within the policies/rules to achieve the objective."

Robin, from a managerial perspective, offered the most balanced response. It recognizes the need by management to give groups and teams the freedom to adapt. Understanding that flexibility empowers the group and the individual. Freedom allows the groups to "respond effectively to changes in industry, technology advancements, and evolving client requirements." However, this freedom did lead to a lack of direction within some teams that precipitated management intervention to re-evaluate goals, prioritize necessary work, and re-establish procedures without "stifling creativity." While not as positively stated, Diane did provide some similar observations in that their organization "used to give the team the freedom to work independently" which led to increased teamwork and trust. This did not address the ability to adapt or change a goal; instead, the process of how the goal was achieved.

Acting on Group Recommendations and Using Knowledge and Skill to Influence Direction

Questions three and six focused on the participants' belief that the organization would act on recommendations made at the group or team level or that the group or team could influence the organization's direction. Like question one, this question asks whether members of an organization are trusted by the organization to make sound decisions and recommendations. Similarly, the response saw little consistency with either solid feelings for or strong feelings against. Of note, however, responses from Rebecca, Robin, and Major Kong, all declared as

management, did offer that their organizations did act on recommendations from the group or team level. Rebecca suggests that their organization, while not able to guarantee action on all recommendations, does perform quarterly reviews where the status of recommendations is reported back to the workforce.

This action of open transparency allows its members to see that they were received, considered, and dispositioned in some manner. Robin noted similar attempts at transparency to improve understood employees' poor perception of management. Major Kong pointed out that demonstrating action or communicating why no action was taken was vital when building trust from the bottom up. Offering, "Don't let things stew – dig in, discover, analyze, assess, act, communicate."

With positive feedback from a non-management perspective, Evan noted that management and leadership in their organization actively seek out input from individuals and teams and make the decision-making process more inclusive and transparent. Conceding that the organization does not always act on recommendations, they listen, consider, and evaluate to cultivate options. Woody, coming from academia, highlighted the transparency evident in the decision-making process to the extent that those bringing forward accepted recommendations were generally part of the group or team that would initiate action plans moving forward.
The remaining participants struck a much less optimistic tone, with Carla summing up the group sentiment with the phrase, "Practice what you preach." Essentially, they were acknowledging that if the organization wants the group or team to have confidence in the organization, the organization needs to demonstrate that they are acting on recommendations or at least bringing them up for consideration. Cliff added that this dynamic has devolved over time, adding the condition of locality to the ability to influence decisions. "When my organization was local to

where I worked, I had confidence that I could walk into a manager's office and get a reasonable response to recommendations. Today, management is far removed, physically, from where we accomplish the work that there is little tolerance for accepting and approving recommendations from the line."

Group or team size was acknowledged as influencing the dynamic as well. Sam goes so far as to say that with a relatively small group size of ten individuals, it was easier to build trust among the small number of group members and the relative closeness of the management and leadership team above them. Building trust made it easier for the individuals in the group to build confidence in their leadership through consistently high-quality work. The small group size also allowed the members to see where the resistance came from, whether it was from a direct leadership position or that of someone higher up in the organization, enabling them to develop strategies for future recommendations.

Systems for Learning

The next question asked the participants to reflect on the systems their organization has in place to store and communicate lessons learned across their organization. A near-universal response was either that the organization did not have a system in place or that it had a system or systems but that most of the organization did not use it regularly. Both Sam and Norm pointed to multiple systems within their respective organization that they used, the first being open communication and the second being a physical system or lessons learned database.

Coming in with a moderate assessment, Major Kong wrote of vertical inspections, and this is assumed to be an organization review from top-down or bottom-up. This contrasts with a horizontal inspection which would look across an organization but stay at the same relative level. The resulting reports and assessments are made available organization-wide and are used to help

"uncover deficiencies and best practices" that can be applied in other parts of the organization. Woody, speaking from an academic background, mentioned a similar system of after-action reviews, "similar to the military," but noted that the results were confined to the team for which they had the most applicability and that they were rarely communicated across the organization, again, noting no formal system in place.

The remaining participants seemed to echo one another in their responses. "This is a complete failure of our organization," "We just don't have a system," "There is poor communication at all levels with zero engagement from senior management," "The absence of a comprehensive and accessible repository for lessons learned has resulted in the same issues resurfacing ."As Robin noted the same issues resurfacing, others repeated the refrain that the organization repeats failures as they try to move forward rapidly. It could be assumed that some of the participants had been in prior organizations where effective systems were in place and used this response as an opportunity to contrast a current system or lack thereof that was ineffective in eliminating failures or reducing risk.

Cross-Organization Problem Solving

The next questions concerned participants' reflections on how their organization encourages looking across the organization to solve problems. The scope of this question could be a little dynamic. For example, Boeing employs more than 140,000 employees (Boeing, n.d.), SpaceX has approximately 9500 (Zippia, 2023), and a small business typically has fewer than 1000 to stay under Small Business Administration (SBA) guidelines (SBA, 2023). Seeking answers across an organization of 175,000 individuals may be more complex than across an organization of ten. The dynamic also changes in the prime contractor/subcontractor dynamic, where "the organization" might include individuals from other companies (Table of size

standards. U.S. Small Business Administration, n.d.). Sam put a spotlight on this dynamic with the observation that "we are encouraged to keep things' in-house' if it is not an issue that needs prime or customer intervention. Based on some of Sam's prior responses, it is assumed that he is a subcontractor and that by "in-house," he means within the confines of his own company. Evan provided concurrence indicating "across the organization is broad spectrum. I may not be aware of the technical expertise outside of the people on my contract."

Woody provided a response that held the most clarity. He noted that when a project was just starting or was still in its infancy, and a problem arose due to the lack of resources in the group, they were encouraged to form cross-functional teams at the group level and seek help from other parts of the organization if needed. He elaborated that this had a two-part result, one that more people were aware of problems and could be mindful of how it might affect their group. The second result is that it worked as a sort of OJT for some people, thus giving the organization individuals that could work in multiple parts of the organization without having to bring on more resources, a sort of doing more with less. As the projects grew, these cross-trained individuals would take on supervisory or leadership roles that were then relied upon to make connections as problems emerged. As the project continued to grow and more resources were granted at the group level, they were encouraged to solve problems at the group level. Cliff stated, "If I'd wanted someone else's input on the task, I would have assigned it to them" as a management response to seeking help outside the group.

Robin and Major Kong had similarly contrarian views. Robin reflected that "we often find ourselves relying on the feedback and input from a select few members who provide us with the answers we want to hear." Major Kong noted:

> Elevating to my level is almost an admission of failure or inability to fix at a lower level. In the first case, confirmation bias begins to breed in the system, in the latter case risk is created in the system where the problem will not be elevated early enough to solve or avoid a problem without giving the appearance of failure."

Changing Staffing Levels and Generational Differences in Sharing Information

Questions seven and nine concerned the impacts of changing staffing levels and the impact of generation differences on the organization. Of all the questions asked, only the question concerning the effects of staffing levels was answered negatively by every participant. And again, Major Kong succinctly said, "We operate in an under resourced environment, but the mission does not wait or depend on our resourcing. The net result is quicker burnout, increased risk of mission failure, and longer-term risk to force."

Both Carla and Cliff noted similar problems, and that is the disparity in the age demographic, with Cliff stating, "We are top heavy on late career engineers," and Carla referenced "greening of the workforce," where late career individuals were replaced with early or mid-career candidates. It results in cost savings for the company. Still, it represents a loss of institutional and specific task knowledge that takes years to recover and creates an unquantifiable risk to the mission or project (Truxillo et al., 2015). Ernie adds, "Staff at lower levels generally carry the company at upper levels," highlighting a reliance on line staff to keep in place mechanisms operating.

The changing staffing levels, as noted by most, are usually but not always accomplished with the introduction of younger, less experienced staff, which may lead to generational differences between the existing staff and new staff that need to be navigated. In what appeared to be a negative observation, Major Kong noted, "We spend a lot more effort communicating the

'why' than we used to, based largely on the generational shift." Taken again, in a military context, this could be viewed as questioning an order or directive, or it could be viewed as seeking to understand the order and the expected outcome. That alone shows an instance of seeking to learn or understand the environment around them. Major Kong and others also noted the increased use and reliance on technology for communication and documentation of efforts. While most of the response centered around young and old or early and late-career, only Evan offered an assessment that specifically included baby boomers, Gen X, and millennials and the stark differences between. Evan noted that millennials tended to be more willing to seek out knowledge than their baby boomer counterparts were to offer information, knowledge, or assistance voluntarily. He added, "Gen X members generally resided somewhere in the middle but generally kept their heads down and their focus on the work, participating if needed offering assistance when and where they saw fit."

Norm provided the perspective of expectations placed on the different generations. The older generations were expected to "know significantly more information and had much stricter successful completion standards." This could mean that the availability of formal training was minimized, and any additional knowledge they did not bring to the workplace would be picked up through informal OJT. The contrast is that the younger or newer employees are "given latitude to fail," and they are allowed to "be laz(ier) than previous generations." According to the participants, the result is "degraded experience and competence levels and increased risk to the project" on which they worked. Though most participants commented on the differences between generations, none expressed a positive view toward having a mix of generations in the workplace. It wasn't until the open-ended, anything else to add question that Rebecca noted that

older and younger generations work well together. "The younger generation brings energy into an otherwise lifeless organization that ends up having a positive impact on the 'old heads'."

Emergent Themes

The 11 interview responses provided 105 total answers, each of varying degrees of specificity. Some participant answers were as brief as "team goals don't get adapted by the individual. Just doesn't happen". In contrast, others provided longer, more expansive responses. The responses were grouped by questions and organized for manual coding and analysis. Saldaña (2013) defines a theme as "a phrase or sentence that identifies what a unit of data is about or what it means" (p. 139). In identifying themes for this study, the researcher looked for repeated codes that helped define the underlying message within each unit of data. Three themes emerged from the codes and included the importance of open communication; the importance of transparency in the organization; and the importance of establishing, building, and maintaining trust among and across members of the organization.

Theme 1: The Importance of Open Communication

Communication, while not the focus of all the questions, was a theme that presented itself across most of the participant responses, regardless of the topic. Bouma et al. (2023) found that effective communication led to faster organizational learning processes. While velocity is not the primary concern of building a strong learning culture, the fact that it is a contributing factor is essential. Further, Bucăţa and Rizescu (2017) defined three types of communication, interpersonal, informational, and decision-making, with each serving a different purpose with another application point and audience associated with each. On the face, this would seem necessary in any organization; however, how it gets implemented and executed can have different results.

As stated earlier, Garud et al. (2011), Lampel et al. (2009), and Starbuck (2017) presented cases for sustaining a lessons-learned culture where experience is documented and an attempt is made to integrate necessary behavioral changes into the ordinary course of business. A lessons-learned culture, in this context, generally implies a system in place for the documentation, curation, and dissemination of information. In other words, a formalized system of communication.

Responses from participants did not indicate that formal systems were employed to any great extent or success. A typical response was that systems did exist. Still, they either were not widely used, or they were overly cumbersome and only really used for items of significant importance or consequence. The Project Management Institute (PMI) Body of Knowledge (PMBOK) defined lessons learned as "the learning gained from the process of performing the project" (PMBOK, 2013, p. 544). Lessons learned intend to promote the recurrence of desirable outcomes and preclude the recurrence of undesirable outcomes. Thus, a lesson learned may not just be focused on a failure; it could result from a process change that recognizes increased efficiency. Given the observations of Diane, "This is a complete failure in our organization," Carla, "We just don't have a system," and Robin, "The absence of a comprehensive and accessible repository for lessons learned has resulted in the same issues resurfacing," failures to implement and aggressively use a system for organization-wide communication leave organizations vulnerable to repeating the same mistakes or failing to capitalize on successes. In some of the responses, participants noted the existence of systems (sometimes multiple systems) but noted the difficulty in using the systems or the bureaucracy involved that makes them counterproductive. Carla went so far as to state that "we're expected to use the gov't system, but that is overly clunk and has too many layers of management and oversight that can

kick items out of the system." Instead of encouraging the use of the system, the very nature of the system drives a member of the organization not to put it to use, thus denying the organization the dissemination of potentially valuable information and learning opportunities.

Another question in the interview dealt with getting help from across the organization to solve problems. This implies getting help without a formal system and deals more with interpersonal communication. The responses to this question highlighted another area where the responses were more critical of the organization than complimentary. Evan observed that the question may have been overly broad, suggesting, "In a large business I may not be aware of the technical expertise outside of the people on my contract," indicating that the object of the question, the organization, may have been ill-defined. Notwithstanding, Woody did acknowledge that his organization, when starting a small project, uses cross-functional teams, "bringing together individuals from different departments and functions to work together on specific issues." These cross-functional teams are assumed to develop appropriate networks as the project grows. Rebecca echoed a similar sentiment: "Employees are encouraged to organize and participate in working groups to address specific problems." Systems such as tiger teams or communities of practice generally emerge from this type of practice (Pattinson et al., 2016).

Robin, Ernie, and Cliff were more critical of their organizations stating in part, "…we often find ourselves relying on the feedback and input from a select few members who provide us with the answers we want to hear.", "It's swim or be swallowed," and "If I'd wanted someone else's input on the task, I would have assigned it to them." Apart from the implied confirmation bias in Robin's response, the sentiments expressed were not that different from other participants on questions across the interview responses. From the responses received, it becomes clear that

while communication is considered essential, the organization constrains how and with whom one communicates.

Theme 2: The Importance of Transparency in the Organization

Related to communication, transparency across the organization was another heavily derived theme in the responses. Berggren and Bernshteyn (2007) found that in companies that were more forthcoming with their employees about their goals, "individual performance and contributions to the organization became more evident" (p. 416). Transparency in the responses to this study took on commentary related to goals and goal setting, as well as horizontal and vertical communication through an organization. In discussing their three types of communication, Bucăţa and Rizescu (2017) further describe decision-making communication decisions that are made in private "but are based on information that has been disclosed before" (p. 51).

Across the participants, the responses were evenly split between no sense of transparency and a fair attempt at maintaining transparency. Again, Norm and Ernie were very direct in their responses, stating, "Quite honestly it fails to do this quite badly" and "They don't", respectively. Cliff notes that transparency within his organization is another condition that has devolved over time, citing a separation in where managers (decision-makers) are located and where the work is performed. Observing that when management was close to the work, those that performed the work had a better chance of being heard.

Carla provided another nuanced response starting with the notion of practicing what you preach, "If you want me to believe that you are going to act on my recommendations, then you have to do so." Carla further explains that not every idea or recommendation brought forward by every employee needs to be implemented. Still, there should be a process by which they are

evaluated and either executed or a rationale given for why it was not. This would align with Bucăţa and Rizescu's (2017) notion that "confidence is created by high upright people (who make promises to them and to others, and keep them)…" (p. 55).

Going to the other side of the spectrum, participants described environments where transparency in communications and decision-making was a hallmark of their organization. Major Kong, again, stating "If no action taken, openly communicating why" and "Frequent touch points with senior leaders allows for early communication of alibis…" are simple ways of building the internal communication structures, developing trust in the organization, and defusing an issue before it becomes a problem. Bucăţa and Rizescu (2017) noted that communication in this manner "facilitates relationships between people and establishes an environment beneficial to the internal development of the organization" (p. 56). These are notions that are helpful in the creation and development of a learning culture.

The subset of participants with positive views on transparency used terms like "regular progress meetings," "accountability," "seeking out input from individuals and teams," and "Management encourages all employees to apply their unique talents." These are notions that speak to building trust in the organization from the top down. As management encourages the use of unique talents, an accountability factor comes along with the individual will be held (Kocak, 2016). That same accountability is maintained throughout the vertical membership as each manager above the individual must give them the freedom to use that talent and ensure that individual, team, and organization goals are still being met (Kocak, 2016).

Theme 3: The Importance of Establishing, Building, and Maintaining Trust Among and Across the Members of the Organization

Another theme to emerge was the importance of trust within the organization. Again, related to communication and transparency, trust seems to form the basis for the other two themes to exist. It is as though without trust, an organization won't be able to make the most of its available communication methods, and without trust, a fully transparent organization will still be looked at skeptically by its members. Rawlins (2008) found a positive correlation between trust and transparency, noting communication as a means to reinforce both.

When discussing how their organizations enable trust-building, Norm, Carla, Ernie, Rebecca, and Evan were unequivocal in their responses. "There are no mechanisms by which trust is formed," "The company does not provide an environment specifically for trust building," "People don't trust," "My organization has not engaged in any specific trust activities," and "My org does not do this" were respective distillations of their experiences.

Both Cliff (27 years experience) and Woody (44 years experience) reflected on how this has changed in their organizations over time, both noting that the dynamic has gotten worse, not better. Cliff noted that the condition has "devolved over time" and alluded to the cost incurred by the company for any additional activities that don't directly support the mission. Woody echoed this sentiment, noting that "the second one (problem-solving retreats) happened less often as money in any particular project got tighter and tighter." These statements imply that the cost of an intervention that would be used to build trust is not worth the return on investment. They make the case that in their experience, the mechanisms may have been there once but have been gradually removed and not replaced with any alternative mechanism.

While there was not a specific action or mechanism that was put in place to develop trust among employees, several of the participants did indicate that it was assumed that trust would be built through normal day-to-day activities. With comments like Sam's, "Over time as we've worked together you get to know one another and their tendencies," and Rebecca's, "Trust building is primarily done through interactions between co-workers ."Here the implication is that the organization does not necessarily take steps to build trust but relies on the members of the organization to build trust among themselves. Carla also notes that even with team building activities in place, "if one person on the team breaks trust…any trust takes a huge hit". When talking about generational differences, Carla also alluded to a trust factor noting, "Mid-career folks try to protect their turf out of fear of losing a job or being relegated to other less desirable tasks." The implication is that the mid-career folks in Carla's experience, don't have the level of trust in the organization necessary for open discussion.

Major Kong encapsulated the current literature on trust as an essential component succinctly,

> For learning to be a continuously effective tenet of an org(anization), there has to be trust by all in the org, enabling members to safely say they don't understand or need help. Orgs without that trust foster a culture of deception, denial, and deceit. Orgs that have that culture of constant introspection, self-evaluation move faster and more effectively.

Robin was the only participant to raise an issue that was antithetical to the question. Robin described an employee who had worked to build trust within the organization, specifically with the owner, and that used that level of trust to manipulate the owner their decision making. The manipulation and adverse use of trust led to "a considerable decline in overall morale." Robin went on to further state, "This uncertainty created a toxic work environment, characterized by

suspicion, skepticism, and reduced collaboration." The implication of this response is that trust was used adversely to undermine the organization. Nešić and Lalić (2016) found a positive correlation between trust and performance. While this does not necessarily speak to an organizational learning culture, it does have an impact on the culture of the organization.

Summary

The purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Eleven individuals participated in structured, written interviews that provided the participants with an open forum for others to understand their experiences in organizational learning cultures in the aerospace industry. These interviews provided an opportunity for people to share their knowledge and experience as well as for others to gain an understanding of and insight into an industry that has had little investigation.

The structured interviews were recorded, analyzed, and coded. Themes were derived from the responses of all 11 participants in the study. The emergent themes which evolved from the data were the importance of communication in the organization, the importance of transparency in the organization, and the importance of establishing, building, and maintaining trust in the organization. Chapter 5 will provide a discussion of the interpretations and implications of the findings of this study as well as recommendations for action.

CHAPTER 5: CONCLUSION

The purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. In the 120 years since the first powered flight, humans have achieved incredible advances in the technology, engineering, and science of aerospace design and operation. These advances were not achieved in a vacuum and resulted from an organizational learning culture in place or created that allowed them to occur (Planing, 2017). Eleven structured, written interviews were used to gather data to help answer the defined research questions focused on participants' perceptions of the learning culture in their organizations. The participants in this study were, or are, active in the aerospace industry.

The data from the 11 interviews were analyzed, and three themes were developed. The themes were derived from the responses of all 11 participants in the study. The emergent themes which evolved from the data were the importance of communication in the organization, the importance of transparency in the organization, and the importance of establishing, building and maintaining trust in the organization. This chapter provides an interpretation of the findings, the implications of this study, and recommendations for action and further study. Bloomberg and Volpe (2018) indicated that a qualitative study starts with questions and ends with the researcher presenting trustworthy conclusions based on the data developed during the study. The research questions that guided this study included:

Research Question 1: How do aerospace industry professionals describe organizational learning culture?

Research Question 2: How do aerospace industry professionals perceive benefits associated with organizational learning culture?

Research Question 3: How do aerospace industry professionals perceive challenges associated with organizational learning culture?

As Bloomberg and Volpe (2018) suggested, this chapter provides the concluding statements and recommendations guided by the study's findings.

Interpretation and Importance of Findings

Bloomberg and Volpe (2018) inform researchers that qualitative research begins with questions, but the ultimate purpose is learning. A researcher collects data from their questions that, in turn, transform into information, which ultimately becomes knowledge. The process of transformation from inquiry to understanding is not mechanical but an intuitive journey led by the researcher (Bloomberg & Volpe, 2018). This section outlines the interpretations and findings for each research question that guided this study. The interview questions generated for this study were primarily adapted, with permission, from the Watkins and Marsick (1996) Dimensions of Learning Organization Questionnaire (DLOQ).

Interpreting the interview responses required taking a step back to the original purpose of the DLOQ. Watkins and Marsick (1996) designed the initial questionnaire as a 6-point Likert scale with poles of "rarely" to "almost always." The questions captured indicators that Watkins and Marsick (1996) had seen in organizations that would eventually mature into what they considered learning Organizations (Watkins & O'Neil, 2013). Organizations that consistently score higher (closer to the almost always pole) across more questions are more likely to be considered as a learning organization or on the path to becoming a learning organization. Several studies have confirmed the validity of the DLOQ in different contexts (Gheorghe et al., 2018; Ju et al., 2021; Nguyen-Duc et al., 2022; Sharifirad, 2011; Song et al., 2009). For this study, the researcher adapted the questions on the questionnaire as open-ended questions to elicit

descriptions of the actions taken or not taken that may provide insight into successful and unsuccessful cultural conditions. Written interview responses that tended more to the positive pole were interpreted as supporting the conditions necessary for developing and sustaining a learning culture.

Interpretations for Research Question 1

Research Question 1, "How do aerospace industry professionals describe organizational learning culture?" was created to explore and understand the experiences of professionals in the aerospace industry as it relates to the organizational learning culture in their organizations. Participants described their experiences and organizations as lacking the attributes of a positive organizational learning culture. The responses, taken in total, describe organizations that demonstrated poor communication, distrust, and a lack of transparency.

Prior research (Garvin, 1993; Pedler et al., 1997; Senge, 1990) has examined how an organization creates a climate for learning. Shin et al. (2017) assert that management does not prescribe the means, does not preclude management from maintaining an environment where learning can occur, is encouraged, and empowers employees to participate actively. Baird and Wang (2010) reasoned that empowerment is the transfer of power from management to the employees concerning authority, responsibility, and influence. The notion of empowerment replaces the idea of responsibility for action without authority. It allows employees at all levels of the organization to contribute to and sustain a learning culture. The 11 participants in this study were, or are, active in the aerospace industry. They provided evidence to explain that their organizational learning culture experiences were marked by poor communication, distrust, and a lack of transparency.

Experienced Poor Communication

Robles (2012), in studying the importance of soft skills on organizational performance, found that employers consider communication skills among employees as second only to integrity as integral to an organization's success. The interview questions for this study were structured in such a way as to elicit comments and descriptions of experiences related to communication from different points of view. Specifically, horizontal communication (across the organization) was evaluated through problem-solving questions. Vertical, or bottom-up, communication was assessed through questions related to feedback to recommendations. Vertical, or top-down, communication was looked at through the lens of communication of goals.

Most of the participants' experiences with organizational learning culture could be characterized as negative. From a strictly horizontal perspective, none of the participants spoke positively about systems in place to communicate problems or seek help or assistance from other parts of the organization. Robin, Ernie, Cliff, and Carla described conditions where seeking help from another part of the organization was actively discouraged. Ernie had the most direct response stating, "They don't encourage, it's swim or be swallowed." Cliff had input along the same lines, adding that his management's view was, "If I'd wanted someone else's input on the task, I would have assigned it to them." Taking a similar but different view, Sam described his organization as not encouraging but not actively discouraging, leaving employees in a sort of limbo.

Observations of poor communication also show how issues or challenges are raised in an organization and elevated to the proper levels (Zhenjing et al., 2022). Employees discouraged from seeking help or assistance may, over time, fail to raise issues at all (Zhenjing et al., 2022). Diane described this as "we repeat failures as we try to move forward with unhealthy speed."

Major Kong noted a cultural "incentive to solve things at the 'action officer' level before elevating." Failing to raise issues may have a similar effect to trying to avoid the negative connotation of having asked for help (Zhenjing et al., 2022). Still, it needs to be balanced by the need to solve problems effectively and quickly (Schmitt et al., 2012).

Building an organization that strives to foster a culture of learning entails creating an environment where employees are encouraged to acquire new knowledge, develop skills, and apply them in their work (Stoffers et al., 2015). However, a barrier that can hinder the development of a robust organizational learning culture is communication (Stoffers et al., 2015). Effective communication is crucial for the success of any organization, as it enables the exchange of information, ideas, and feedback (Holley, 2023).

Organizations seeking to develop a culture of organizational learning would then have systems that facilitate clear and open communication (Dunbar, 2014). Without effective communication, disseminating knowledge and fostering a learning culture becomes challenging. Again, Diane noted, "This is a complete failure of our organization. We do not disseminate information on lessons learned." Ernie added, "There is poor communication at all levels with zero engagement from senior management…" Robin provided a similar view, "This approach can lead to a limited perspective and hinder the problem-solving process."

Communication is vital in creating and maintaining a positive organizational learning culture. Clear and open communication allows employees to share ideas, experiences, and best practices (Stoffers et al., 2015). Communication enables individuals to learn from each other's successes and failures, enhancing their knowledge and skills. Furthermore, communication fosters a sense of collaboration and teamwork within the organization. Employees can work together, exchange information, and learn from one another's expertise. Yet this is not what was

described in the interviews. While some, like Major Kong, might exist in a formal structure where communication is expected, Woody noted that his organization performs "after action reviews similar to the military". Or Sam noted two methods of communication, both "weekly standups" and a "formal lessons learned database." Although present in some interview responses, the other participants in the study had a negative view of the communication methods and execution in their organization.

Experienced Distrust

Fulmer and Gelfand (2012) found that trust has implications across an organization, from individual performance to group teamwork and leadership success at the organizational level. The interview questions in this study that dealt primarily with trust issues were the only questions that received overwhelmingly negative responses. Participants in the study expressed that they had found instances of distrust in their organization. This distrust may have been with other individuals in the organization or with the organization itself.

Diane described this most pointedly of all the participants, stating, "When a company is known for certain issues and monetary shortcomings, it is difficult to recruit and retain employees." While not pointing out any specific instance of distrust, Diane does raise trust to an organizational level implying that they have either belonged to or know an organization that did not act in a trustful manner and that reputation stayed with the organization. According to Kuwabara (2015), this may become a cyclical problem where instances of mistrust internal to an organization lead to external reputational issues that then create or illuminate additional distrust issues internal or external to the organization.

Some participants, mainly those with longer careers in the industry, described situations as having worsened over time. Cliff, speaking with 27 years of experience, stated, "In my

experience, management is now more focused on getting the most done with the least amount of added cost to realize the greatest possible profit." This was in response to actions taken to help build trust, and Cliff points out that those actions come at a cost that impacts an organization's bottom line. A variety of causes of distrust were discussed, ranging from cost savings, as Cliff noted, "As time goes on and the focus shifts from mission to profits, everything that eats away at profit eventually gets taken away from the workforce," to personnel turnover where Norm observed, "Negative changes dramatically decrease safety as it puts increased pressure on remaining staff to complete the same amount of tasks."

The participants with this longer-term view of trust and trust building expressed a sense of loss, or at the very least a missed opportunity, to continue to build on activities that were important in the past and had come with an intangible benefit. The participants in the study identified instances of distrust within their organizations, whether it was directed toward specific individuals or the organization. These instances of distrust can have negative consequences on individual and organizational performance. Research has highlighted the detrimental effects of distrust on individual and organizational performance (Coleman Gallagher et al., 2016; Connelly et al., 2012; Kadam & Kareem Abdul, 2022; Lewicki et al., 1998; Marineau, 2017).

Experienced a Lack of Transparency

In recent years, the aerospace industry has faced numerous challenges in terms of organizational learning culture (Dorfman et al., 2022). One significant factor that adversely affects this culture is the lack of transparency within organizations (Chen & Haga, 2022). Transparency refers to the openness and accessibility of information within an organization (Chen & Haga, 2022). When there is a lack of transparency, it hinders the ability of employees to access and share information necessary for learning and improvement (Masood et al., 2023).

The lack of transparency impedes the exchange of knowledge and best practices among employees. Without transparency, employees cannot access information about successful projects or lessons learned from previous experiences. This lack of information sharing decreases the overall knowledge and learning within the organization, as employees cannot build upon existing knowledge and experiences. Secondly, the lack of transparency in the aerospace industry impedes collaboration and teamwork. Employees in a transparent organization are more likely to collaborate and work together toward common goals (Ndlovu et al., 2021).

However, in a culture of secrecy and limited information sharing, employees are likelier to work in silos and withhold information from others (Chen & Haga, 2022). This lack of collaboration hinders the organization's ability to learn from collective experiences and limits the potential for innovative solutions. Research has shown that organizations worldwide have made significant efforts to promote knowledge sharing and information transfer in the workplace (Anwar et al., 2019).

Among the participants of this study, they described that transparency broke down along the lines of the participant's role in the organization. Four of the 11 participants with management roles had a more positive view of how transparent their organization was. They expressed opinions that give the impression that transparency is a recognized, important attribute of their organization and that they act in a manner that would be considered transparent. Evan stated, "Mgmt and leadership do listen, they seek out input from individuals and teams." Diane added, "…gave the team freedom to work independently to develop many project(s), increasing teamwork and mutual trust."

Rebecca noted that her organization uses an annual employee survey and quarterly management reviews to report back statuses of significant recommendations. This kind of

transparency allows for open communication and sharing of information within an organization (Albu & Flyverbom, 2019). This, in turn, creates a sense of trust and accountability among employees, fostering a culture of continuous learning and improvement (Albu & Flyverbom, 2019). When employees have access to information regarding organizational goals, strategies, and performance, they are better able to align their individual efforts with the overall objectives of the organization (Bernstein, 2012). Furthermore, transparency enables employees to make informed decisions and take ownership of their learning and development (Sobering, 2019). Transparency not only promotes effective and efficient business operations, but it also contributes to developing a learning culture within an organization (Bernstein, 2012; Froehlich et al., 2014; Rhodes et al., 2008). Robin noted a need to move toward more transparency stating, "Some at our company understand the importance of listening to our employees' insights and ideas…we believe that transparent decision-making is a key to help turn this around."

This view was, however, contrasted by the responses from non-management participants. With comments such as "confidence in the system is negatively impacted" from Sam, "practice what you preach" from Carla, and "this has devolved over time" from Cliff. Chen and Haga (2022) stated that-for transparency to exist, there needs to be an equal recognition of the information flow between the information provider and the decision maker. There also needs to be an openness to the decision-making process and communication of the reason for action or inaction. This attribute can be viewed from two different perspectives, with two separate conclusions being drawn. This means a message communicated from management could be seen as effectively distributed and ineffectively distributed by the receiving members of an organization.

Interpretations for Research Question 2

Research Question 2, "How do aerospace industry professionals perceive benefits associated with organizational learning culture?" was created to understand the benefits of an organizational learning culture as seen through the lens of the professionals in the aerospace industry. After evaluating participant responses, the participants described benefits derived from an organizational learning culture, including a sense of comradery or team and reduced loss of learning capacity. While these are occasionally cited as lesser effects, they did not figure prominently in the available literature.

From the available literature, increased innovation (Jiménez-Jiménez & Sanz-Valle, 2011; Ning & Li, 2018; Pérez-Luño et al., 2019; Planing, 2017), improved learning transfer (Cromwell & Kolb, 2004, Salas, et al. 2012), and reduced turnover intention (Cho & Lewis, 2011; Cohen et al., 2016; Lee-Kelley et al., 2007; Shore et. al., 2006) were the most commonly cited benefits achieved by an organization with an active learning culture. Likewise, these were not referenced attributes in the participant interview responses.

Sense of Team

In today's ever-evolving business landscape, organizations increasingly recognize the importance of fostering a positive organizational learning culture (Lee & Jin, 2022). Research suggests that an organizational learning culture encourages workplace cooperation and nurtures the employees' learning capabilities (Khan et al., 2020). Furthermore, an organizational learning culture has positively affected employee motivation, job satisfaction, and overall performance (Khan et al., 2020). One of the key factors contributing to a positive organizational learning culture is the comradery among its members (Khan et al., 2020). Comradery, which refers to a

sense of team and mutual support among individuals within an organization, plays a role in cultivating a positive organizational learning culture (Belle, 2016)

The comradery among members enhances collaboration and teamwork, as individuals feel a sense of belonging and support from their colleagues (Belle, 2016). This promotes open communication, knowledge sharing, and a willingness to learn from one another (Inków, 2020). Additionally, comradery fosters a sense of trust and psychological safety within the organization (Inków, 2020). Members who feel supported and valued by their peers are more likely to take risks, ask questions, and engage in the learning process without fear of judgment or retribution (Plomp et al., 2019).

Most participants drew contrasts between management and non-management roles and presented responses in an us versus them context. Ernie, a non-management individual, suggested, "Listen to your staff, support and encourage them," and later added, "Staff at lower levels carry the company at higher levels." Effective teamwork is crucial in achieving organizational goals (Hanaysha, 2016). Ernie suggested a lack of teamwork between management and non-management employees. This lack of teamwork can be detrimental to the overall success and performance of the organization. Due to team performance's complexity, management and non-management employees need to work together cohesively to achieve optimal results (Johnsson, 2018).

Participant responses tended to be more supportive of team efforts and team accomplishments. Both Diane and Robin captured the sentiment by noting that their teams were able to work with greater independence. Diane stated, "The ODA/Certification wing gave the team the freedom to work independently to develop projects, increasing teamwork and trust." From a management perspective, Robin noted, "flexibility empowers our teams to respond

effectively to changes in the industry, technology advancements, and evolving client requirements." Both indicate that teams had better performance and teambuilding results when given opportunities to work independently. Research studies have shown that team cohesion, or a sense of belonging to a team, is vital for the success of that team (Monavvarian & Asri, 2012). Despite recognizing the importance of teamwork in organizations, there seems to be a lack of collaboration and cooperation between management and non-management employees (Morley et al., 2015).

Woody made a more expansive observation, noting that through the life cycle of a project, those that start small give the project members a chance to work closely at first and develop a sense of relationship and trust. He shared, "Early members of the project are often, not always, promoted into leadership positions as the project expands." One reason is the "breadth of knowledge" gained over time, and another is the "relationships that have been built within the organizations," according to Woody. This has the added benefit of developing project leaders that will continue that development process within their teams (Williams, 2019).

In project management, the size of a project can significantly impact various aspects, such as leadership development and relationship building (Williams, 2019). Woody's observation highlights a correlation between small projects and the opportunity for team members to work closely and develop a sense of relationship and trust. This observation suggests that small projects create a conducive environment for the formation of strong relationships among team members, which can then lead to their promotion into leadership positions as the project expands. This promotion is influenced by two key factors: the depth of knowledge gained over time and the relationships built within the organization (Williams, 2019). Research supports Woody's observation by highlighting the role of leadership in relationship-

building efforts and its impact on project performance. The literature acknowledges the central part of leadership in fostering relationship-building efforts within project-based organizing, as recognized in the promotion of regional development (Dudgeon et al., 2017).

Learning Capacity

In organizational settings, building a positive learning culture is necessary to foster continuous education and development among employees (Suprapto et al., 2021). One of the key benefits of creating a positive learning culture is the reduced loss of learning capacity (Salisu & Bakar, 2020). Research suggests that organizations with a strong learning culture promote workplace cooperation and nurture employees' learning capabilities (Khan et al., 2020). This means that employees can retain and apply the knowledge and skills they acquire, leading to a more knowledgeable and competent workforce.

By creating an environment that values and encourages learning, organizations can minimize the loss of knowledge and skills that often occurs when employees leave or retire (Chanani & Wibowo, 2019). This reduced loss of learning capacity has numerous advantages for organizations. Primarily, reduced loss of learning capacity ensures that organizational knowledge and expertise are preserved (Suprapto et al., 2021). This means that even when employees leave or retire, the organization can still benefit from their knowledge and skills (Khan et al., 2020).

This loss of knowledge was not discussed by most of the participants. Taken as an attribute missing from their organizations, it is assumed to be a benefit if it did exist. Sam stated, "There is always a noticeable drop in productivity after a couple of people leave the organization." Concerning a co-worker leaving and being replaced with a younger, less expensive employee, Carla observed, "This is a huge adverse impact on the overall ability or

skill set of any group." Cliff had a similar response noting, "It represents an unquantifiable risk in that we've lost a knowledge base and have replaced it with a blank slate." Finally, Rebecca provided a comprehensive view,

> Unpredicted staff reductions are extremely harmful to the morale of the organization. The result has been increased stress levels and the feeling that employees continue to be asked to do more with less. When employees know that the customer doesn't have the ability to staff projects at the level they need to be, the result has been voluntary attrition.

The participants in this study did not describe how having a positive learning culture in their organization has led to staff and knowledge retention. Instead, they described conditions or the result of not having a positive learning culture and the impact on the organization through the loss of employees and their cumulative knowledge.

Interpretations for Research Question 3

Research Question 3, "How do aerospace industry professionals perceive challenges associated with organizational learning culture?" was created to understand the challenges of an organizational learning culture as seen through the lens of the professionals in the aerospace industry. Participants in this study noted characteristics such as the lack of flexibility in establishing and adjusting goals and generational differences as challenges in their environments. Like Research Question 2, the available literature mainly points to employee motivation (Mahmoud et al., 2021; Morris, 1970; Moustakas, 2018) and turnover (Cohen et al., 2016; Emami et al., 2012; Islam et al., 2013; Powell & Snellman, 2004).

Lack of Flexible Goals

When discussing the ability to adapt goals, Carla said, "This is a non-starter." The lack of flexible goals in the workplace can be a significant barrier to fostering a positive learning culture,

particularly from the perspective of adult learning theory (Kesici, 2022). According to the principles of adult learning theory, adults are self-directed learners with a strong desire for autonomy and the ability to control their learning experiences. However, when workplace goals are rigid and inflexible, they restrict the autonomy and self-direction that adults seek in their learning process (Knowles, 1984). Carla continued, "At the team level, individuals have little latitude to adjust goals. I've never seen this in practice."

Adult learning theory emphasizes the importance of relevancy and immediate application of knowledge in the learning process (Knowles, 1968). When workplace goals are rigidly defined without considering adult learners' diverse needs and interests, it becomes challenging to establish a connection between the learning goals and their practical application in the workplace (Johnson, 2022). Rebecca noted that "Goals in my organization often need to be modified as a result of funding shortfalls." Evan shared, "Goals and objectives get adjusted in the near-term based on funding levels on the contract and the needs of other groups." This, however, takes autonomy away from the individual and ties the adaptation of the goal to an external cause. (Gruenberg et al., 2021). The absence of flexible goals in the workplace may prevent learners from tailoring their learning experiences to their specific needs, thereby impeding the development of a positive learning culture (Gruenberg et al., 2021).

To cultivate a positive learning culture, adult learners need to be able to set goals that align with their personal and professional aspirations and adapt these goals as they navigate their learning journey (Jonah, 2022). However, rigid workplace goals often prioritize organizational objectives over individual learning needs. This misalignment can create a sense of frustration and demotivation among adult learners, as their personal goals may be overshadowed or disregarded in favor of organizational targets (Bamdas et al., 2022; Brookfield, 2013). By

incorporating flexibility in goal-setting processes, organizations can foster a culture that values and supports individual growth and development, leading to a more positive and engaging learning environment (Bamdas et al., 2022).

Adult learners thrive in environments that encourage collaboration, reflection, and active participation in the learning process (Knowles, 1968). However, inflexible workplace goals can limit opportunities for collaborative learning and hinder employee exchange of ideas and knowledge. When goals are rigidly defined, employees may feel pressured to compete with one another rather than collaborate, inhibiting the creation of a supportive learning community (Kesici, 2022; Wenger et al., 2002). Cliff described rigidly defined goals: "We support end product or end state, and we are expected to achieve that goal. Altering it risks violating contract deliverables." By promoting flexible goals that encourage collaboration and shared learning experiences, organizations can facilitate a positive learning culture that embraces collective growth and fosters a sense of belonging (Kesici, 2022).

Flexibility in goal setting also promotes a growth mindset among adult learners (Mrazek et al., 2018). When workplace goals are rigid, the focus often shifts toward achieving fixed outcomes, leaving little room for experimentation, innovation, and adaptability (Johnson, 2022). On the other hand, flexible goals enable learners to embrace a growth mindset by encouraging them to view setbacks and challenges as opportunities for learning and improvement (Dweck, 2006; Khan et al., 2020). By integrating flexible goal-setting practices, organizations can create a culture that supports continuous learning, encourages risk-taking, and fosters resilience among adult learners (Nordengren, 2019).

Generational Differences

Generational differences can often pose a significant barrier to fostering a positive learning culture, especially when viewed through the lens of adult learning theory (Knowles, 1968). The generational differences among the study participants cannot be determined as there the only question asked regarding duration. For example, it could be assumed that a participant with 46 years of experience that started straight out of college at age 21 would have been born about 1956, putting them in the baby boomer generation. However, a participant with only six years of aerospace experience could come from the same generation with 40 additional years supporting another industry. Generational questions in this study were directed at generational striation within the participant's organization.

One aspect of adult learning theory is recognizing that adults bring a wealth of life experiences and prior knowledge to the learning process (Issah, 2020). However, these experiences and knowledge can vary significantly across generations, creating potential conflicts and challenges in the learning environment (Gillett-Swan, 2017). For example, older generations may value traditional teaching methods and prefer a more structured approach to learning, while younger generations might be more accustomed to digital and interactive learning experiences. This aligns with Evan's notion that the younger generation appreciates "additional information in smaller bites." Robin noted a similar issue: "The owner's traditional approach to operating the business may not align with the expectations and preferences of the more tech-savvy, younger employees, leading to friction and miscommunication." These differing preferences can lead to misunderstandings and resistance to new approaches, hindering the development of a cohesive and inclusive learning culture (Chander et al., 2020).

Another aspect of adult learning theory that is influenced by generational differences is the concept of motivation (Gorges et al., 2017). Different generations have unique motivations

for engaging in learning activities. For instance, older adults may be motivated to gain new skills for career advancement or personal fulfillment. At the same time, younger generations might be driven by a need for immediate applicability and relevance (Gorges et al., 2017). Major Kong noted an increase in "effort communicating the 'why'" with the younger generation Major Kong did not elaborate on the need to explain "why," but it can be interpreted as not so much questioning the direction but instead trying to understand the direction. This would indicate a departure in motivation from the prior generation. These contrasting motivations may create tension and hinder the development of a positive learning culture if not adequately addressed (Gorges et al., 2017). Organizations must understand and accommodate these generational motivations, fostering an environment that supports diverse learning objectives and individual goals (Jonah, 2022).

Communication styles also play a vital role in the impact of generational differences on a positive learning culture (Samadi et al., 2015). Each generation has its preferred modes of communication, influenced by the technological advancements and societal changes experienced during their formative years (Samadi et al., 2015). For example, one generation may prefer face-to-face interactions and formal written communication, while another may be more comfortable with digital communication platforms and informal, rapid exchanges (Dalton et al., 2020). Such disparities in communication styles can lead to miscommunication and misunderstandings, impeding the creation of a collaborative and inclusive learning culture (Dalton et al., 2020). Rebecca highlighted this, as noted earlier, stating in part, "The younger generation tends to document in real-time…older generation tends to document in notebooks and compile at the end of a project". While the two ways are not incompatible, the latter presents missed opportunities for sharing information and knowledge (Alrawi et al., 2013).

Participants in this study had a generally favorable view of how the different generations interact and share knowledge within their organizations. Norm, Carla, Woody, Rebecca, and Evan pointed to the technology gap between generations noting that younger-generation employees quickly adapt to the release and implementation of new tools. In comparison, older-generation employees stick with the tools to which they have become accustomed. Norm stated, "Generational differences are readily apparent." Woody shared, "The generation that quickly adapts to the changes in technology, usually the younger generation, finds ways to share (information and knowledge), sometimes oversharing."

Even with the differences, organizationally, they could bridge the existing gaps. Regarding transfer and sharing of knowledge, most participants spoke highly of the younger generation employees noting, as Evan stated, "Younger generation tend to act like a sponge and hungry for additional information in small bites." Sam went so far as to say that the younger generation is more apt to take to email or messaging applications to announce and solve a problem than the older generation, given a sense of more willingness to ask for help when needed.

Implications

This section discusses the implications of this study aligned with the rationale and significance as detailed in Chapter 1. Exploring the lived experiences of aerospace professionals and their perception of organizational learning culture in their respective organizations has many implications. Škerlavaj et al. defined organizational learning culture as "a set of norms and values about the functioning of an organization" (2007, p. 346). Organizational learning culture helps an organization to continuously improve by adapting to changing environments by enhancing its capacity to improve performance and apply self-transformation (Gerrard &

Cunningham, 2000; Senge, 1990). This study provided 11 participants the platform and opportunity to share their experiences and perceptions of organizational learning culture. Each participant had a unique experience as it relates to their organization.

Kontoghiorghes et al. (2005) assessed relationships between the characteristics of a learning organization and an organization's ability to adapt, innovate, and perform. Škerlavaj et al. (2007) examined the link between organizational learning culture and business process change and performance and found a positive correlation. Depending on the culture created from an organization's inception or deliberately crafted over time, the impacts of that culture are felt at the individual, team, and organizational levels (Kim et al., 2017). The strength of that learning culture can positively impact performance, innovation, and success, again at the individual, team, and organizational levels (Hung et al., 2010). In the aerospace industry, positive impacts on performance, innovation, and success can indicate a safer and lower-risk operating environment (Jiménez-Jiménez & Sanz-Valle, 2011).

Results from this study indicate that the participants did not hold strong perceptions of a positive learning culture. While there were some indications from the responses that certain organizations may do something to encourage a robust organizational learning culture, the responses were, by and large, negative. This leads the researcher to conclude that the overall perception of learning cultures in their organizations is relatively low among the participants. As prior research has indicated, organizations that promote a positive learning culture benefit from its impact in terms of improved performance (Hung et al., 2010), increased innovation (Jiménez-Jiménez & Sanz-Valle, 2011), and reduced turnover intention (Cho & Lewis, 2011; Cohen et al., 2016).

The findings of this study can be important to stakeholders in the aerospace community and organizations supporting aerospace at the organizational, group, and individual levels. While the results may not reflect any given organization, they may offer signs or indicators of what should be looked for in an organization. Organizations that suffer from higher-than-average attrition lag competitors in innovation, or have indications of worsening performance over time, may well consider the possibility of assessing the members of their organization for their perceptions. By understanding the perceptions of professionals in the aerospace industry towards organizational learning culture, stakeholders can gain valuable insights into the factors that may impact organizational performance and success and make informed decisions to improve their operations. Furthermore, understanding stakeholders' perceptions in the aerospace industry can provide valuable insights into employee engagement, communication effectiveness, and overall organizational climate. This can help organizations identify areas of improvement and develop strategies to enhance employee satisfaction, collaboration, and productivity.

Recommendations for Action

The purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Participants in this study were provided a platform and opportunity to share their experiences and perceptions of organizational learning culture in their respective organizations. Questions developed for this study were adapted, with permission, from Watkins and Marsick's (1996) DLOQ. Data gathered from the written interviews, the development of emergent themes from the data, and a review of the available literature provided the researcher with the opportunity to create three recommendations for action.

Based on participant responses, the first recommendation is for an organization to assess the effectiveness of its organizational communication methods. According to Argote and Miron-Spector (2011), organizational learning happens when there is a change in the knowledge of an organization. For that change in knowledge to occur, some information, data, or knowledge should be communicated, at least from one individual to another. Organizations seeking to develop a culture of organizational learning would then have systems that facilitate clear and open communication. Carla noted that "early career people…use some of the more readily available tools: Slack, Teams, etc.". Rebecca noted a similar condition among the younger generation and that the older generation tends to "document in notebooks or on a local device." That the systems for communication exist does not mean that they are being used efficiently and effectively. Both Carla and Rebecca suggest that systems are in place, but people are using different means to communicate, leading to ineffective knowledge transfer.

Organizations, and the people in them, have several means of communicating information, whether face-to-face, email, social media, instant messaging, or meetings and seminars. In addition, organizations may employ systems such as a lessons learned database, communities of practice, or other knowledge management tools. Consistent use of systems across an organization becomes central to effective communication (Maurer et al., 2023). As Carla and Rebecca pointed out, if a portion of your workforce is using Slack or Teams for messaging and the rest of the organization is using email for communicating the same issues, a break in communication exists.

Having a system that goes unused creates the same problems. As Evan stated concerning a lessons learned database, "We can contribute to a government system, but I am not aware of anyone on the contractor side that uses the system to any great degree." As Rowe and Sikes

(2006) noted, two essential qualities of a successful lessons-learned system exist. The first is capturing new lessons learned and assessing current performance against existing lessons learned begins at the initiation of a new project. That emphasis on its importance is projected by the project management team. Second, the organization's senior management is committed to the process and emphasizes best practices to ensure its implementation. The process Rowe and Sikes (2006) alluded to is the process of using the system consistently and broadly across an organization for the system to have the most significant impact.

The second recommendation, based on participant responses, is for an organization to establish mechanisms for clear and consistent communication of goals and objectives at the organizational level down through the individual level. This would begin with distributing organizational mission, vision, and goals. For an organization, a mission statement is a written declaration that communicates the purpose of an organization (Bart & Hupfer, 2004; Macedo et al., 2016). Klemm et al. (1991) make an important distinction when specifying that mission statements can be used for internal or external purposes. Internal purposes imply using the mission statement to motivate employees and to align staff objectives. In contrast, external purposes are served when the mission statement is used to enhance the company image and promote external relations. Klemm et al. (1991) findings suggested that managers see mission statements to have a more critical role internally than externally.

Similar to a mission, a corporate vision is a written statement on where the organization sees itself in the future (Slack et al., 2010). Parasuraman et al. (1985) recognized a link between vision statements, organizational culture, and employee perceptions. Further, Harber et al. (1997) identified that cultural changes, such as the inclusion of a vision, affect employee outcomes such as organizational commitment or, stated another way, turnover intention. Harber

et al. (1997) also noted links to the openness of communication, which affected organizational commitment and performance.

Goals and objectives are formal statements of how an organization will achieve its vision through the successful execution of interim steps (Mohr, 1973). Established goals, whether on the individual, group, or organizational level, ensure that actions are taken in furtherance of those goals rather than acting counter to the intent of the goal (Mohr, 1973). Tying the three together, for an organization, the mission declares who the organization is, the vision describes how they see themselves in the future, and the goals and objectives show how they will achieve that vision. According to the previous recommendation, communication across the organization is essential to attain all three. Recalling Major Kong's comment, "demonstrating action, keeping accountability as a tenet at all levels. If no action is taken, openly communicating why." Major Kong calls for action, ostensibly, on what the organizational aims are and, if not taking action, at the very least, communicating the reason why.

With organizational, team, and individual goals and objectives in hand, the mission and vision statements provide additional context and clarity to understand why action or direction is taken across the organization. Lee and Suh (2023) found a positive correlation between mission statements and leadership practices that leads to higher employee performance. By providing the individual components of information, the organization will be placing individuals and teams in a better position to understand why they (the individuals and groups) are being directed by the organization and for what purpose.

Lastly, it is recommended that organizations assess and benchmark organizational trust attributes against peer organizations. Kutsyuruba and Walker (2017) described trust as a fundamental concept in human interactions and that it was "pivotal for establishing and

mediating the social structures in organizations" (p. 2). Kutsyuruba and Walker defined distrust as "a rational, wise, or warranted response to a past or anticipated violations, based on knowledge, experience or difference in values" (2017, p. 7). This sentiment aligns with a comment that Sam made, specifically,

> This is a question that gets to the heart of trust from a management down perspective. I have seen incredibly smart and talented engineers sidelined because they had not built a level of trust with their managers. I've also seen some pretty stupid people elevated to positions well beyond their abilities simply because they played the game better than others.

Dietz and Den Hartog (2006), in evaluating and measuring trust in an organization, suggested, among other tactics, establishing a benchmark or a measurable standard to assess against. In the case of organizational trust, several metrics could be established within the organization and against comparable peer organizations. Among those metrics are competence, integrity, and dependability/reliability. By measuring internal conditions and comparing results with a benchmark organization or industry standard, organizations would have better understood their strengths and weaknesses. They would have the ability to knowledgeably develop action plans to improve (Dietz & Den Hartog, 2006).

Recommendations for Further Study

As stated earlier, there were delimitations and limitations to this study that could have potentially weakened or narrowed the scope of the study. These concern how the researcher chose to bound the study so that the study's aims and objectives do not spiral out of control and remain possible to achieve (Theofanidis & Fountouki, 2019), which in this study included the site and type of interview conducted. With estimates that suggest over 500,000 individuals in the

United States support the aerospace field (Aerospace Industry Spotlight, 2021), a study that looks at only 11 participants does not necessarily represent the views of the larger whole. In conducting anonymous, written interviews, the researcher could not ask follow-up questions or seek clarification from the participants.

Further, Bloomberg and Volpe (2018) described limitations as conditions that are external to the study that restricts or constrains the scope, and that may affect the study's outcome. Thus, the limitation established by the number of participants involved in the study leaves much to be discovered concerning the phenomenon of employee perceptions of organizational learning culture in the aerospace industry. Additional studies that significantly increase the participant pool could refine the findings of this study and establish distinct avenues of research.

Accepting these initial conditions does leave open many avenues for further study of the phenomenon. An extension of this study could benefit from a mixed-method approach where both quantitative and qualitative results are considered (Johnson & Onwuegbuzie, 2007). First, further research should look to bound the participant pool. In this study, the aerospace industry, in general, was used as the participant pool. Subsequent researchers could partner with large organizations such as NASA or the American Institute for Aeronautics and Astronautics (AIAA) to administer the Dimensions of Learning Organization Questionnaire (DLOQ) as it was initially presented as a Likert Scale questionnaire. The questions raised in this study adapted the questions from the DLOQ to elicit an open-ended response instead of a one to six measurement. By tapping a more narrowly bounded participant pool and asking additional demographic questions, researchers could delineate initial perceptions of organizational learning culture among government, commercial, and academic participants, large and small business employees,

management and non-management employees to gain a baseline understanding of the phenomenon in a variety of settings within the aerospace industry.

Studies examining various organizations and populations have also been used using the DLOQ. Results from the above recommendation could be used to baseline responses from the aerospace industry against similar sectors, such as finance, medical manufacturing, or the military. Following up these assessments with qualitative studies like this could help organizations develop a profile of successful and unsuccessful characteristics among participating organizations.

For example, a researcher could start with NASA as an entire organization, including civil servants and support contractors. Demographically, the participant pool could be broken down into civil servants and contractors. Civil servants could be further broken down by the center they support, the program or project they support, or the directorate they support. Individuals could further be broken down by job type. Contractors could be broken down by location, small or large businesses, and individuals by job type. Additional qualitative studies could be facilitated by the individual centers and/or by contractor councils that generally exist to further the aims of large and small businesses in service of that center. For example, the Ames Contractor Council (ACC) is a volunteer group of companies with contracts, either prime or subcontract, supporting work at the NASA Ames Research Center in Mountain View, CA. Collaborating with the ACC would give future researchers direct access to the target population.

Conclusion

Senge (1990) originally defined learning organizations as places "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are

continually learning to see the whole together" (p. 3). Cleveland and Plastrik (1995) further described a learning organization as a place that provides principles and practices that enable organizational learning to occur. Johnston and Hawke (2002) defined a learning culture as "…the existence of a set of attitudes, values, and practices within an organization which support and encourage a continuing process of learning for the organization and/or its members" (p. 9). Research has shown that organizations with an internal culture that leans toward supporting learning, known as learning culture, have higher performance levels (Lim, 1995). Many studies over the years have shown that organizations with strong learning cultures offer improved performance, innovation, and employee satisfaction (Ellinger et al., 2002; Habtoor et al., 2017; Kim et al., 2017; Kontoghiorghes et al., 2005; Sharma, 2020; Yadav & Rajak, 2021). These studies have assessed a variety of different industry settings and occupational disciplines. However, for the aerospace industry specifically, there is no discoverable, current research that describes or characterizes learning culture.

The purpose of this qualitative phenomenological study was to explore perceptions about organizational learning culture held by professionals in the aerospace industry. Pantouvakis and Bouranta (2017) described an organizational learning culture as encouraging employees to refresh and increase their individual knowledge, seek to become skilled in new technologies and expand their capabilities following environmental change. This description builds on Škerlavaj et al. (2007) definition of an organizational learning culture, "a set of norms and values about the functioning of an organization" (p. 347). Škerlavaj et al. (2007) definition built on Marsick and Watkin's (2003) contention that culture is established by an organization's leadership and critical stakeholders who possess the ability to learn from their and others' experiences, can influence learning throughout an organization and can create an environment that identifies, supports, and

rewards efforts that model desired results. This study was guided by three research questions: How do aerospace industry professionals describe organizational learning culture? How do aerospace industry professionals perceive benefits associated with organizational learning culture? How do aerospace industry professionals perceive challenges related to organizational learning culture?

The review of literature conducted for this study focused on defining an organizational learning culture and the attributes that research has found to be beneficial to organizations with positive organizational learning cultures and the attributes that are barriers to the development and sustainment of a positive organizational learning culture. The available literature identified attributes such as increased innovation, increased learning transfer, and reduced turnover intention as benefits. The literature also identified attributes such as motivation and turnover as barriers. These collective attributes were reviewed for in the study results.

This study used Knowles' (1968) adult learning theory as the theoretical framework for this research. Developed by Knowles (1968), it posits that adults learn differently than adolescents and that adult learning (andragogy) is distinct and identifies the learning styles which suit adults best. Among Knowles' (1968) original work and later updated work are six assumptions: (a) the need to know why they (the adult learner) need to learn something, (b) the learner's self-concept, (c) prior experience(s), (d) readiness to learn, (e) orientation to learning, and (f) motivation (Knowles et al., 2005).

Eleven individuals that identified as professionals in the aerospace industry participated in this study. Written interviews were captured using Google Forms, and responses were recorded, reviewed, and manually coded. Emergent themes were developed from the coded responses. The themes that align with this study include the importance of open communication,

the importance of transparency in the decision-making process, and the importance of establishing, building, and maintaining trust among and across the organization's members.

Findings from this study helped guide and answer the research questions. Participants were given the opportunity to reflect and share their experiences of organizational learning culture in the aerospace industry. Participants generally found that their experiences reflected organizations that used open communication effectively in varying degrees experience instances where a lack of transparency or trust adversely affected productivity, innovation, and execution of the mission. The participants described attributes such as a strong sense of team and reduced loss of learning capacity as benefits created by a positive organizational learning culture. They also described attributes such as a lack of flexible goals and generational differences as barriers to creating or sustaining a positive organizational learning culture.

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APPENDIX A

SURVEY INSTRUMENT APPROVAL

Re: DLOQ Use

Marsick, Victoria <marsick@exchange.tc.columbia.edu>
Sun 9/19/2021 12:02 AM
To: Derek Collins <dcollins12@une.edu>
Cc: marsick@tc.columbia.edu <marsick@tc.columbia.edu>;Karen Watkins <kwatkins@uga.edu>

1 attachments (299 KB)
Non techinical manual.pdf;

You don't often get email from marsick@exchange.tc.columbia.edu. Learn why this is important

Hello Derek

We are pleased to give you permission to use the DLOQ survey in your study. You don't need permission to use the DLOQ to guide interview questions. Several of my students have done that in their studies as well.

Please do cite us. Appropriate citation is on p. 140 of the attached.

Regards
Dr. Marsick

On Fri, Sep 17, 2021 at 4:46 PM Derek Collins <dcollins12@une.edu> wrote:

> Dr. Marsick, my name is Derek Collins and I am a doctoral student at the University of New England. I am currently working on completing an EdD in Educational Leadership and am writing a dissertation on the perception of learning organization attributes in a small business, aerospace entity. Aerospace is near and dear to my heart as I have been a NASA contractor for over 20 years and currently run a small aerospace company in California.
>
> My study is comprised of two parts. The first part is a survey of employees at a particular company using the DLOQ. The second part is person to person interview with a subset of participants using the DLOQ as a guide. It has been suggested to me, by my advisors, that I get permission on both points.
>
> I had read in "The Dimensions of the Learning Questionnaire; A Nontechnical Manual" that researchers could use part or all of the DLOQ in a larger survey if the DLOQ is cited correctly. This should not be an issue on my end, but I still wanted to ask permission to use it in my survey. My intent is to use the 21-question survey with only a few additional demographic questions.
>
> The second part is not as straight forward. To gain some additional understanding of why people responded the way they did, I wanted to take a subset of questions and conduct person to person interviews. In these interviews, I had intended to ask the questions as open-ended questions to illicit a more nuanced respond. For example, instead of asking "In my organization, people help each other learn", I would want to ask, "In your organization, how do people help each other learn?"
>
> The person-to-person interview would occur after the survey has been completed so that the original responses are not influenced by the latter discussion.
>
> Thank you so much for your help,
> Derek Collins
> This e-mail may contain information that is privileged and confidential. If you suspect that you were not the intended recipient, please delete it and notify the sender as soon as possible.

--
Victoria J. Marsick, Ph.D.
Academic Director, Adult Learning & Leadership
Department of Organization & Leadership
Teachers College, Columbia University
(212) 678-3754

APPENDIX B

RECRUITMENT FLYER

Posted date and time: TBD
Subject Line: Aerospace Professionals Needed for Organizational Learning Culture Study
Post Body Text:
Good afternoon to my fellow aerospace professionals. For those of you who don't know me, my name is Derek Collins, and I have been involved in the industry since 1997. It began fulfilling a lifelong dream of a kid that grew up watching Star Trek reruns on WSBK. I am also a doctoral candidate at the University of New England. Currently, I am in the process of completing my dissertation and I need some help to conduct the research.

You are eligible to participate in this study if you are:

- Over 18 years old
- Have specific experience in the aerospace industry. For this study, specific experience will be defined as currently or formerly employed by a private company, a federal agency, academia, or a non-profit organization for the purposes of design, development, test, evaluation, manufacture, operation, and/or disposal of components, systems, or vehicles intended for an aerospace environment.

Participation in this research is voluntary. If you meet the participant criteria and would like to participate in this study, please continue to the link below that will lead you to the consent form and questions. The consent form outlines the purpose, risk and benefits, and privacy concerns of the study. The questions document will be available in an MSWord file that contains the 14 questions asked. The first five are basic demographic questions, the remaining nine form the basis of the study and are open ended questions intended to draw on your experience in the industry. Participation in this study should take approximately 60 minutes

Once you have started a response, you'll need to complete the entire form. If questions are left blank or without a response, the entire response will be removed from the consideration. My advice would be to download the questions, read them, give yourself some time for reflection, and then complete the answers in a separate document from which you can cut and paste the answers into the response form.

<<Link to Study>>

All data will be kept confidential and pseudonyms will be used to protect the identities of respondents. All identifying information, including organizations, will be deidentified.
If you have any questions or concerns about your participation or the study itself, please do not hesitate to contract me at dcollins12@une.edu.

Thank you for your consideration of participation in this study.

Regards,

Derek Collins

Doctoral Student

University of New England

APPENDIX C

PARTCIPATION INFORMATION SHEET

Version Date:	21 February 2023
IRB Project #:	*0223-12*
Title of Project:	Perceptions of learning culture in the aerospace industry
Principal Investigator (PI):	Derek. J. Collins
PI Contact Information:	*Dcollins12@une.edu or (650)457-9062*

INTRODUCTION

- This is a project being conducted for research purposes. Your participation is completely voluntary.
- The intent of the Participant Information Sheet is to provide you with important details about this research project.
- You are encouraged to ask any questions about this research project, now, during or after the project is complete.
- The use of the word 'we' in the Information Sheet refers to the Principal Investigator and/or other research staff.

WHAT IS THE PURPOSE OF THIS PROJECT?

The general purpose of this research project is to understand the perceptions of individuals in the aerospace industry of the learning culture in the aerospace industry. A minimum of 10 participants will be used in this study.

- This research project is being conducted as part of the principal investigator's dissertation.

WHY ARE YOU BEING ASKED TO PARTICIPATE IN THIS PROJECT?

You are being asked to participate in this research project because you are 18 years of age or older and identify as having specific experience in the aerospace industry. For this study, specific experience will be defined as currently or formerly employed by a private company, a federal agency, an academic institution, or a non-profit organization for the purposes of design, development, test, evaluation, manufacture, operation, and/or disposal of components, systems, or vehicles intended for an aerospace environment. Participation will not be limited by discipline in that any individual meeting the above criteria will be eligible to participate regardless of education, years of experience, or functional discipline within their organization.

WHAT IS INVOLVED IN THIS PROJECT?

You will be asked to complete a written, structured interview through Google Forms that should take approximately 60 minutes to complete.

WHAT ARE THE POSSIBLE RISKS OR DISCOMFORTS INVOLVED FROM BEING IN THIS PROJECT?

The risks involved with participation in this research project are minimal and may include an invasion of privacy or breach of confidentiality. This risk will be minimized by eliminating any identifying information from the study. Participants have the right to skip or not answer any questions, for any reason.

Please see the 'WHAT ABOUT PRIVACY & CONFIDENTIALITY?' section below for additional steps we will take to minimize an invasion of privacy or breach of confidentiality from occurring.

WHAT ARE THE POSSIBLE BENEFITS FROM BEING IN THIS PROJECT?

There are no likely benefits to you by being in this research project; however, the information we collect may help us understand the nature of individual's perceptions on their organizations learning culture.

WILL YOU BE COMPENSATED FOR BEING IN THIS PROJECT?

You will not be compensated for being in this research project.

WHAT ABOUT PRIVACY AND CONFIDENTIALITY?

We will do our best to keep your personal information private and confidential. However, we cannot guarantee absolute confidentiality. Since this is an anonymous interview, personal information will not be captured, including IP addresses of computers used to complete the interview. Any references to individuals or organizations will be removed from the completed interview and assigned pseudonyms by the principal investigator. Additionally, your responses in this research project could be reviewed by representatives of the University such as the Office of Research Integrity and/or the Institutional Review Board.

The results of this research project may be shown at meetings or published in journals to inform other professionals. If any papers or talks are given about this research, your name will not be used. We may use data from this research project that has been permanently stripped of personal identifiers in future research without obtaining your consent.

- Data will only be collected through the structured interviews conducted through Google Forms. Only the researcher will have access to the Google Forms data, with access through two-factor authentication.
- No names, email addresses, or IP addresses will be collected.
- No names or email addresses will be kept during the recruitment phase and any direct responses to the AIAA Engage post will be deleted.
- No data collected from the participant will be considered in the study unless the participant clicks a submit link in the Google Form for their responses to be recorded.
- Once the written interview has been submitted, it cannot be removed from the study as there will be no identifying information.
- Participants are instructed not to use personal names or organizational names. Any names found in the responses will further be assigned pseudonyms and any potentially identifying information will be stripped from the written interview responses.

- All study data will be retained for 3 years after the completion of the study and then destroyed. The study data may be accessed upon request by representatives of the University (e.g., faculty advisors, Office of Research Integrity, etc.) when necessary.
- All data collected will be stored on a password protected personal laptop computer accessible only by the principal investigator.
- Data collected through Google Forms will be deleted after use.
- There are instances where large volumes of data are better analyzed in hard copy form where they can be sorted, combined, and compared. In the event that electronic data is printed in hardcopy form for analysis purposes, all hard copies will be destroyed using a cross-cut shredder immediately after use.
- Data will not be exported in digital form to be used in analysis by a subsequent, third-party analysis tool.

WHAT IF YOU WANT TO WITHDRAW FROM THIS PROJECT?

You have the right to choose not to participate, or to withdraw your participation at any time until the written interview is submitted without penalty or loss of benefits. You will not be treated differently if you decide to stop taking part in this project.
No data collected about you will be considered in the study unless you click a submit link in the Google Form for your responses to be recorded.
Once the written interview has been submitted, it cannot be removed from the study as there will be no identifying information.

WHAT IF YOU HAVE QUESTIONS ABOUT THIS PROJECT?

You have the right to ask, and have answered, any questions you may have about this research project. If you have questions about this project, complaints or concerns, you should contact the Principal Investigator listed on the first page of this document. To maintain the anonymity of the participant, text messages to the phone number listed would be preferred.

WHAT IF YOU HAVE QUESTIONS ABOUT YOUR RIGHTS AS A RESEARCH PARTICIPANT?

If you have questions or concerns about your rights as a research participant, or if you would like to obtain information or offer input, you may contact the Office of Research Integrity at (207) 602-2244 or via e-mail at irb@une.edu.

APPENDIX D

Structured Interview Questions

1. Have you read and do you understand the Consent for Participation in Research?
2. In what area of aerospace would you characterize your experience?
    a. Government
    b. Industry
    c. Academia
    d. Non-profit / non-governmental organization
    e. Retired
    f. Other
3. Within your organization, what best describes your role?
    a. Management
    b. Non-management, technical
    c. Non-management, non-technical
4. How many years have you spent in the industry?
5. Describe how your organization enables members to spend time building trust with each other? Describe your experience engaging in trust building activities.
6. Describe how your organization gives teams/groups the freedom to adapt their goals as needed? Can you describe an occasion when you have seen this in practice?
7. How does your organization encourage confidence among teams/groups that the organization will act on their recommendations?

8. How does your organization make its lessons learned available to all employees? Are systems available to all employees and are the lessons learned current and actionable?
9. How does your organization encourage people to get answers from across the organization when solving problems?
10. Describe to what degree members of your organization are enabled to use their knowledge and skills to influence the direction of the organization.
11. Describe how changes in staffing levels positively or adversely affect the capabilities of the groups within your organization.
12. How does your organization encourage teams/groups to revise their thinking as a result of group discussions or information collected?
13. In your organization, how do generational differences impact the way in which knowledge and information is shared across the organization?
14. Is there anything else you would like to add about the culture of learning in your organization that you have not had a chance to address.

APPENDIX E

IRB Exempt Approval

UNE UNIVERSITY OF NEW ENGLAND
INNOVATION FOR A HEALTHIER PLANET

Office of Research Integrity
Institutional Review Board

Biddeford Campus
11 Hills Beach Road
Biddeford, ME 04005
(207) 602-2244 T
(207) 602-5905 F

Portland Campus
716 Stevens Avenue
Portland, ME 04103

DATE OF LETTER: February 22, 2023

PRINCIPAL INVESTIGATOR: Derek J. Collins
FACULTY ADVISOR: Andrea Disque, Ed.D.

PROJECT NUMBER: 0223-12
RECORD NUMBER: 0223-12-01

PROJECT TITLE: Perceptions of Learning Culture in the Aerospace Industry

SUBMISSION TYPE: New Project
SUBMISSION DATE: February 15, 2023

ACTION: Determination of Exempt Status
DECISION DATE: February 22, 2023

REVIEW CATEGORY: Exemption Category # 2i

The Office of Research Integrity has reviewed the materials submitted in connection with the above-referenced project and has determined that the proposed work is exempt from IRB review and oversight as defined by 45 CFR 46.104.

You are responsible for conducting this project in accordance with the approved study documents, and all applicable UNE policies and procedures.

If any changes to the design of the study are contemplated (e.g., revision to the research proposal summary, data collection instruments, interview/survey questions, recruitment materials, participant information sheet, and/or other approved study documents), the Principal Investigator must submit an amendment for review to ensure the requested change(s) will not alter the exempt status of the project.

If you have any questions, please send an e-mail to irb@une.edu and reference the project number as specified above within the correspondence.

Best Regards,

Bob Kennedy, MS
Director of Research Integrity

APPENDIX F

IRB Revision Approval

UNIVERSITY OF NEW ENGLAND
INNOVATION FOR A HEALTHIER PLANET

Office of Research Integrity
Institutional Review Board

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11 Hills Beach Road
Biddeford, ME 04005
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Portland Campus
716 Stevens Avenue
Portland, ME 04103

DATE OF LETTER: April 10, 2023

PRINCIPAL INVESTIGATOR: Derek J. Collins
FACULTY ADVISOR: Andrea Disque, Ed.D.

PROJECT NUMBER: 0223-12
RECORD NUMBER: 0223-12-02 (Amendment #1)
REVIEW TYPE: Administrative

PROJECT TITLE: Perceptions of Learning Culture in the Aerospace Industry

SUBMISSION TYPE: Amendment
SUBMISSION DATE: April 8, 2023

DECISION: Acknowledged
DECISION DATE: April 10, 2023

The Office of Research Integrity has reviewed the materials submitted in connection with the above-referenced amendment and has acknowledged this submission. No further action is required at this time.

The changes requested as part of this amendment include the following:

- This revision request approval to expand the recruitment area from the AIAA electronic bulletin board application to the researchers personal LinkedIn profile as well as several aerospace-centric pages on LinkedIn.

If you have any questions, please send an e-mail to irb@une.edu and reference the project number specified above within the correspondence.

Best Regards,

Bob Kennedy, MS
Director of Research Integrity