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THESIS

LEARNING TECHNOLOGY ADOPTION:
NAVY BARRIERS AND RESISTANCE

by

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Technological developments offer opportunities to enhance training effectiveness, in support of achieving high-velocity learning. However, resistance to change can be an immense barrier to technology adoption. This study was established to answer the following primary research questions: (1) How are Navy processes likely to influence the adoption and use of new learning technologies? (2) What unique organizational and individual barriers must be addressed to mitigate friction between new learning technologies and Navy processes, structure and culture? In addition, the following secondary research question was addressed: What behaviors, job performance and learning outcomes are enabled by new learning technologies?

Interviews and surveys of Navy students and faculty at Naval Postgraduate School (NPS) were conducted, and we surveyed enlisted students at Training Support Center (TSC) Great Lakes to support a quantitative and qualitative analysis. Our study revealed an organizational, generationally culture-dependent trend toward resistance to change and exposed barriers unique to the Navy. Our findings suggested that the hierarchical nature of the Navy restrains innovation and technology adoption. Furthermore, resistance caused by a limited perception of usefulness stems from inadequate communication, technology development, and end-user buy-in. Based on these results, we recommended measures to foster an innovative culture and support implementation efforts.

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LEARNING TECHNOLOGY ADOPTION: NAVY BARRIERS AND RESISTANCE

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LIST OF ACRONYMS AND ABBREVIATIONS

CNO	Chief of Naval Operations
CVF	Competing Values Framework
DoD	Department of Defense
FTF	Face-to-Face
IS	Information Systems
IT	Information Technology
NKO	Navy Knowledge Online
NPS	Naval Postgraduate School
PBC	Perceived Behavioral Control
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
SQB	Status Quo Bias
SN	Subjective Norm
TAM	Technology Acceptance Model
TPB	Theory of Planed Behavior
TSC	Training Support Center
TWMS	Total Workforce Management System
VLE	Virtual Learning Environment
VSH	Virtual School House

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I. INTRODUCTION

A. BACKGROUND

1. High-Velocity Learning

An important theme of the Chief of Naval Operation's (CNO) "A Design for Maintaining Maritime Superiority" is achieving high-velocity learning within naval education and training. High-velocity learning involves applying "the best concepts, techniques and *technologies* to accelerate learning as individuals, teams and organizations" (Richardson, 2016, p. 7). Under the CNO's leadership, naval personnel are considering what opportunities for enhanced training might be offered by learning-centered technologies. This is evident in the CNO's statement, "We must do everything we can to seize the potential afforded by" the current age of technology, since "our competitors are moving quickly, and our adversaries are bent on leaving us swirling in their wake." (Richardson, 2016, p. 3).

2. Modernization

As part of trying to achieve high-velocity learning, it is important to understand that new recruits are entering the Navy with more and more experience using technology in education: for instance, students are using tablets in the classroom as early as kindergarten. The Sailor of the future has likely gone through years of education using technology-mediated instruction. This fact further necessitates the need for the Navy to modernize and innovate its training and education programs, augmenting them with technology. This is further supported by the process of achieving high-velocity learning, evidenced by the CNO's statement, "Adapt processes to be inherently receptive to innovation and creativity" and "Expand the use of learning-centered technologies, simulators, online gaming, analytics and other tools as a means to bring in creativity, operational agility and insight" (Richardson, 2016, p. 7). Furthermore, Loermans (2002) supports this idea in his discussion of how technology is essential in the foundation of a learning organization. He goes on to define a learning organization as one that embodies and supports the principles of

organizational learning, which improve the "organization's capability to take effective action" (Loermans, 2002, p. 286).

3. Training Review and Transformation

Additionally, the rash of Navy incidents in 2017, specifically the USS *John S. McCain* and the USS *Fitzgerald* crashes, brought congressional and media attention to Navy processes and training. As a result, Admiral Richardson, CNO, gave testimony before the Senate Armed Services Committee about the incidents aboard the USS *Fitzgerald* and USS *John S. McCain* discussing the courses of action being taken, which included that the "effort will review individual training and professional development, to include seamanship, navigation, voyage planning, leader development and all aspects of tactical training" (*Recent United States Navy Incidents*, 2017, p. 2). These incidents have necessitated an in-depth review of training and education programs as part of a root-cause analysis. This concern about training calls into question whether we are conducting training by the most effective means, utilizing all applicable technological resources. The importance of this issue is further highlighted by the CNO's statement, "These incidents demand our full attention to provide our Sailors the necessary resources and training to execute their assigned missions" (*Recent United States Navy Incidents*, 2017, p. 4).

4. Complications with Technology Adoption

Unfortunately, the adoption of new learning technologies is not always a simple, smooth process, as elaborated on in Chapter II, the adoption of technology in organizations can be greatly affected by the behaviors, attitudes, values, and perceptions deeply rooted within an organization that arise from its culture type, processes, and structure, as well as by behaviors inherent in individuals based on their own personal beliefs and perceptions (Karahanna & Polites, 2012; Silva, 2015). This fact necessitates a deeper look into whether the Navy's deep-rooted culture, processes, or hierarchy might be keeping us from optimizing training and education programs through the unobstructed integration of emerging learning-centered technology. Furthermore, the CNO wants all levels on board with the potential improvements in the learning process that all members of the Navy can

benefit from (Richardson, 2016). This study is applicable to every naval community and Naval Education and Training Command and subordinate commands.

B. PURPOSE

The purpose of this study is to identify the Navy's organizational and individual barriers to and enablers of the adoption and use of new learning technologies. Specifically, the thesis attempts to discover the role of Navy processes, structure, and culture in such matters. Additionally, it seeks out to evaluate which behaviors of job performance and learning outcomes are empowered by such technology. The objective is to discern those organizational and individual barriers that are specific to the Navy to form recommendations for mitigating resistance to learning technologies.

C. RESEARCH QUESTIONS

Our study answers the following primary research questions: (1) How are Navy processes likely to influence the adoption and use of new learning technologies? (2) What unique organizational and individual barriers the Navy must address to mitigate friction between new learning technologies and Navy processes, structure and culture? The following secondary research question is addressed: What behaviors and job performance and learning outcomes are enabled by new learning technologies?

D. METHODOLOGY

This thesis takes both a qualitative and quantitative approach to answering the aforementioned research questions. The analysis includes a thorough literature review and in-person interviews (qualitative) and surveys (quantitative) with NPS Navy students and military faculty. The literature on learning technologies is used to identify behaviors that are either enabled or constrained by technology, as well as divulge how learning and job performance are influenced by such behaviors. The surveys and interviews serve as a means to gather and assess the perspectives of naval leaders, training agents, learners, and other stakeholders on new technologies and the consequent behaviors. The analysis of data compares learning technology experiences of individuals both within and across groups using thematic analysis, which consists of identifying, recording, and examining trends and

overlaps within the data. Such patterns are good indicators of substantial barriers worth exploring further.

E. ORGANIZATION

The remainder of this report is organized as follows: Chapter II is the literature review which examines the findings of relevant studies in several areas: organizational culture resistance to change and to adoption of technology; individual resistance to change and to adoption of technology; individual and organizational affinity for adhering to the status quo; and behaviors enabled by learning technologies. Chapter III discusses our methodology and the conditions under which we conducted our interviews and surveys. Chapter IV discusses all results and findings of our data analysis. This report concludes with a summary of the report, discussion of results and implications, and recommendations for future research.

F. SUMMARY

With the constant struggle within the Department of Defense (DoD) to determine how best to distribute funding and the challenges that arise when working in an environment with limited financial resources, it is imperative to seek out improved ways of doing business. This approach should include initiatives to do things not only cheaper but better. The CNO's vision is that the Navy should be engaged in a process of continuous improvement, in an effort to be "better today than we were yesterday" (as cited in Stewart, 2016, para. 12). The civilian industry has proven that there are growing opportunities for learning-centered technologies to augment Navy training and education. This report will provide a deeper understanding of whether Navy culture, processes, and individual behaviors and perceptions are enabling or constraining the adoption of learning-centered technology. The findings of this report afford us the opportunity to gain insight into potential barriers within the Navy to technologically enhanced training and education programs and how those barriers can be mitigated through the more fluid adoption and implementation of technology-mediated learning. The recommendations of this report will support the Navy's adoption of learning-center technologies.

II. LITERATURE REVIEW

A. INTRODUCTION

There is no doubt that most naval personnel are aware that the organization's processes are often bound by layers of hierarchical structure, rules, procedures, doctrine, regulations, and civilian authority that can slow or even halt change. However, there is not an extensive amount of research on the Navy's cultural and individual level behaviors, attitudes, and perceptions on change, specifically technological change. Further complicating this research area is a perceived reluctance of military leadership to openly reflect and advise on technology implementation failures. Additionally, there is a lack of available, detailed research on Navy technology adoption successes and failures as well as evaluations of the behavioral affordances from successful technology implementations. This could be due to the idea that measuring effectiveness of learning-centered technologies in military training and education is very different and likely more complicated than in the civilian sector. Consequently, this study turned to the review of literature to expound upon theoretical frameworks on organizational barriers to change, individual resistance to change, and behaviors enabled by learning technologies. Our literature review focuses on the Competing Values Framework for organizational culture resistance, Technology Acceptance Model for individual resistance, status quo bias theory for both levels, and technology-mediated learning research for behaviors enabled.

B. RESISTANCE TERMINOLOGY OVERVIEW

1. Technology Resistance

In order to determine how to go about mitigating resistance to learning-centered technologies, it is vitally important to first thoroughly understand what user resistance is and what causes it. This discussion serves as an introduction to user resistance, while subsequent sections expound upon the causes of resistance. User Resistance is defined as "the individual tendency to avoid making changes" (Rey-Moreno & Medina-Molina, 2017, p. 174) or "is often manifested as failure of a user to switch from an incumbent technology to a newly introduced one" (Karahanna & Polites, 2012, p. 21). Additionally, IT resistance

has been defined as “behaviors intended to prevent the implementation or use of a system or to prevent system designers from achieving their objective” (Beaudry & Lapointe, 2014, p. 4621). Specifically concerning technology adoption and implementation, Kim and Kankanhalli (2009) discuss that the most significant challenge to implementing a large information system is user resistance. Some even claim that user resistance is ‘“at the root of many enterprise software project failures” (Ali, Zhou, Miller, & Ieromonachou, 2016, p. 35). Therefore, user resistance to technology plays a key role in the potential successful adoption of that technology into the organization.

2. Resistance

A study revealed that “resistance is the second most important contributor to time and budget overruns and is the fourth most important barrier to overall implementation” (as cited in Klaus & Blanton, 2010, p. 626). There are two forms of resistance: active resistance and passive resistance (Rey-Moreno & Medina-Molina, 2017; Van Tonder, 2017). Active resistance refers to negative attitudes that generally result from unfavorable functional (usage, value, risk) and psychological (norm, tradition, image) evaluations of a particular new product (Rey-Moreno & Medina-Molina, 2017; Van Tonder, 2017). In other words, active resistance is influenced by specific instances (Rey-Moreno & Medina-Molina, 2017). Passive resistance, on the other hand, is negative attitudes that are formed prior to any evaluation of the new product (Rey-Moreno & Medina-Molina, 2017). Thus, passive resistance can be connected to subconscious elements such as user “satisfaction with the status quo and a general inclination to resist change” (Rey-Moreno & Medina-Molina, 2017; Van Tonder, 2017, p. 643). With passive resistance, innovation is rebuffed at the “knowledge” stage (Van Tonder, 2017, p. 643).

3. Acceptance

Vital to overcoming resistance is understanding the concept of “acceptance.” That said, acceptance is “either the usage behavior...or as the behavioral intention to use it” (Beaudry & Lapointe, 2014, p. 4620). Furthermore, it is often thought of as a process (Beaudry & Lapointe, 2014). In terms of IT, “acceptance” also encompasses “initial use,

purchasing, a post-implementation behavior, doing things beyond one's responsibility to ensure system success" (Beaudry & Lapointe, 2014, p. 4620).

4. Behavior

Furthermore, user behavior is driven by one's mindset, which consists of "emotions, cognitions, and attitudes" (Beaudry & Lapointe, 2014, p. 4622). Therefore, it is important to understand behaviors in order to understand users' willingness to adopt technology. Beaudry and Lapointe (2014) categorize behavior into five archetypes: ambivalent behaviors, deviant behaviors, dissident behaviors, engaged behaviors, and resigned behaviors. Such behaviors are the product of IT usage policies and the aforementioned mindsets. The relationship of these archetypes is portrayed in Figure 1.

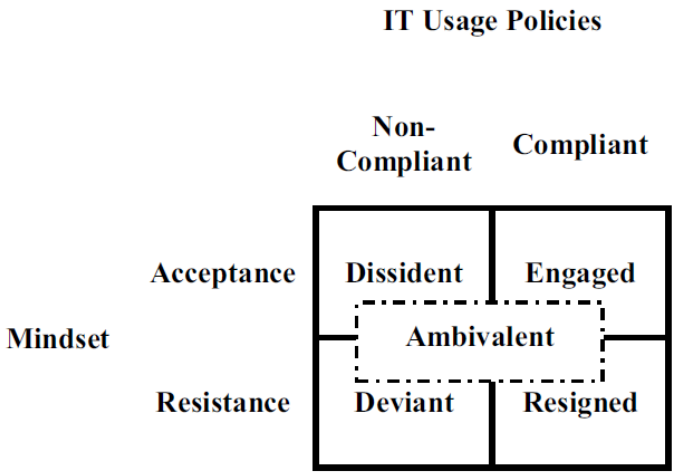

Figure 1. A Typology of IT User Behaviors. Source: Beaudry and Lapointe (2014).

Ambivalent behavior, which is often synonymous with "adjectives such as 'conflicted' and 'indecisive,'" exists in times when there is ambiguity (Beaudry & Lapointe, 2014, p. 4624). By virtue, it blurs the lines as it does not form a quadrant of its own, but instead overlaps the all four quadrants consisting of the remaining unambiguous behaviors. When dealing with organizational change, this ambivalence is the most recognized behavior among individuals (Beaudry & Lapointe, 2014). Deviant behaviors

are those behaviors that are "associated with a resistance mindset and that are not compliant with IT usage policies" (Beaudry & Lapointe, 2014, p. 4624). Conversely, dissident behaviors are defined as those "associated with an acceptance mindset but are non-compliant with IT usage policies and depart from what is considered 'normal' in a given context" (Beaudry & Lapointe, 2014, p. 4624). Dissident behaviors typically accompany self-interest, where users act out of personal interest versus organizational interest (Beaudry & Lapointe, 2014). Engaged behavior illustrates organizational commitment as it refers to "task behaviors that promote connections to work and to others" (Beaudry & Lapointe, 2014, p. 4623). Finally, resigned behaviors include those behaviors that are "associated with a resistance mindset…but that are compliant with IT usage policies" (Beaudry & Lapointe, 2014, p. 4623). Thus, this resignation is when users are mostly averse to adopting a technological innovation, but do so anyway. As alluded to earlier, the final component of the Beaudry and Lapointe's (2014) typology is IT Usage Policies. These policies are classified as either non-compliant or compliant (Beaudry & Lapointe, 2014), which simply refers to whether a policy is accepted or faces resistance (Beaudry & Lapointe, 2014).

Answers to questions surrounding the up-and-coming issue of technological resistance are currently scarce, if they exist at all. The literature suggests that to reduce technology resistance among users, it is imperative that organizations first fully comprehend what causes it. Karahanna and Polites (2012) declare that "to design effective interventions aimed at counteracting both conscious and subconscious bias toward incumbent system use, it is first necessary to understand the exact mechanisms by which these factors impact new system acceptance" (p. 22). Furthermore, "perceived value and organizational support for change" are believed to minimize resistance (Kim & Kankanhalli, 2009, p. 578).

C. ORGANIZATIONAL CULTURE RESISTANCE TO CHANGE

While the previous section develops a baseline understanding of what resistance and acceptance is, it is important to understand the implications of an organizations culture on resistance and how organizational processes can generate resistance. The Navy's core

values, beliefs, structure, processes, and traditions create a deep-seated culture that determines stakeholder's attitudes and behaviors toward the adoption of technologies. Hartnell, Ou, and Kinicki (2011) support the idea that organizational culture consists of "values, beliefs, and assumptions" that are imbued within the personnel across all levels of the organization (p. 677). Personnel across the organization, in turn, leverage these shared core beliefs and values to make decisions within the organization, resulting in an impact on their attitudes and behaviors (Hartnell et al., 2011). To successfully implement learning technologies, the Navy must acknowledge and understand organizational culture resistance toward change.

1. Competing Values Framework

One major framework consistently referred to in research on the study of organizational culture is the Competing Values Framework (CVF) (Hartnell et al., 2011; Cameron & Quinn, 2006, p. 35). The legitimacy and utility of this framework for analyzing organizational culture and behaviors is further supported by Hartnell et al. (2011) who state, "...measures of organizational culture that directly or indirectly assess the CVF have been administered in over 10,000 organizations globally." (p. 678). This framework divides organizational cultures along two dimensions, structure and focus. Along the structure dimension, organizational effectiveness can be categorized according to "flexibility and discretion" versus "stability and control" of organizational processes, whereas, the focus dimension characterizes organizational effectiveness according to "internal focus and integration" versus an "external focus and differentiation" (Cameron & Quinn, 2006, p. 35). With this categorization of organizations along these dimensions, four cultural types exist: Clan, Adhocracy, Hierarchy, and Market (Cameron & Quinn, 2006). Figure 2 illustrates the CVF described below.

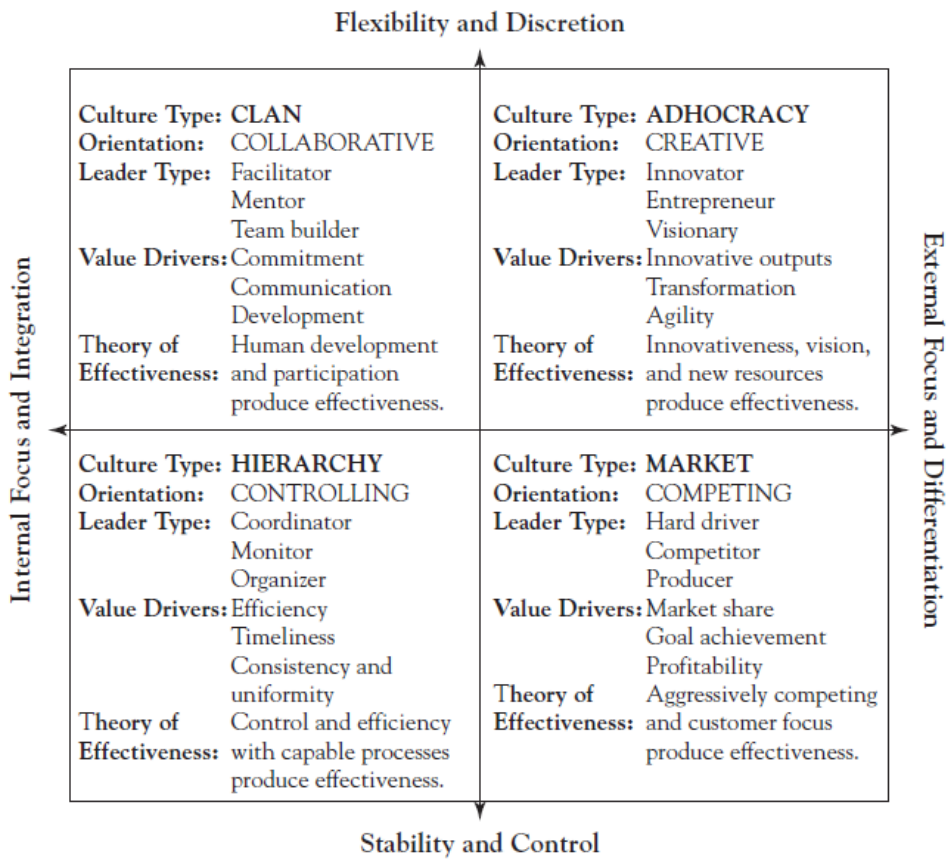

Figure 2. Illustrative Summary of the Competing Values Framework.
Source: Cameron & Quinn (2006).

2. Four Culture Types

The various cultural types "define the core values on which judgments about organizations are made" (Cameron & Quinn, 2006, p. 35). Clan organizations have an internal focus, high flexibility, and are known for their collaborative and cohesive behaviors (Hartnell et al., 2011). Hartnell et al. (2011) also describe how adhocracy organizations have an external focus and flexible structure, and are known for their creative, innovative, adaptable, and risk-taking behaviors. The same study reveals that hierarchy organizations have an internal focus and stable and controlled structure and are known for their conforming, predictable, efficient, and routine. Hartnell et al. (2011) describe the final cultural type, market organizations, as having an external focus, stable, controlled structure, and are known for their competitive, productive, achievement-driven

behaviors. According to Cameron and Quinn (2006), the four cultural types "represent opposite or competing assumptions" (p. 35). For instance, organizations in the hierarchy culture type have opposing values and measures of effectiveness compared to organizations in the adhocracy culture type.

Within this framework, Cameron and Quinn (2006) allude to the idea that the military would have a more hierarchical cultural type, stating, "Other organizations are viewed as effective if they are stable, predictable, and mechanistic" (p. 34) for instance, "government agencies (such as the Justice Department) provide prototypical examples of a hierarchy culture" (p. 38). We concur with this assertion, and we expect most military members would agree with this categorization of the Navy.

3. Hierarchy Culture Type

There is much to value about an organization, like the Navy, that is stable and strives for effectiveness and control. There are many admirable qualities, values, and behaviors in the Navy's hierarchical type of organization, including accountability, stability, efficiency, and precision. It is how we get the most bang for the buck with tax dollars while effectively meeting our missions. However, this cultural type presents a few major downsides in terms of resistance to change. One disadvantage of the hierarchy culture, according to the literature, is that the adhocracy, not hierarchy, culture type cultivates innovation (Naranjo-Valencia, Jiménez-Jiménez, & Sanz-Valle, 2011). Additionally, research indicates that routines, tradition, and formalized procedures associated with hierarchical organizations can create inertia, leading to resistant behaviors (Karahanna & Polites, 2012). Furthermore, Austin, Buenger, Conlon, and Daft (1996) state that "embedded routine may discourage the search for new technologies and methods." (p. 562). Revelations from these various studies suggest that the inherent predictable, routine, regulatory, and bureaucratic nature of the Navy lends itself to structural organizational resistance to change. Further supporting this position is the idea that flexible and externally-focused cultures will tend toward innovation (Naranjo-Valencia, et al., 2011). As can be seen in Figure 2, both innovation-oriented dimensions are encompassed in the adhocracy culture type and not the opposing hierarchy quadrant. Thus, it can be inferred

that hierarchical organizations inherent values and behaviors make them less likely to be innovative. Essentially, research indicates that organizations with adhocracy culture types are better at harnessing an innovative culture, so a hierarchical organization may want to try to shift more toward adhocracy to try become more innovative and creative.

4. Recommendations for Hierarchical Organizations

Some research recommends that organizations attempting to shift their culture toward the adhocracy culture type should try to create task forces at lower levels of the organization to develop new ideas; motivate an innovative culture by creating systems to reward those behaviors across the entire organization; conduct training at all levels to demonstrate the importance and potential applications of creative thinking; have the highest levels of leadership confer with mid-level managers to ensure the new direction and values have filtered down effectively; and break away from zero-defect mentalities by praise and publicize experimentation and learning (Cameron & Quinn, 2006). Cameron & Quinn (2006) also indicate that "it takes a great deal of effort and leadership to make the change to a clan or adhocracy culture" (p. 80). Therefore, from an organizational perspective, it is imperative that cultural change toward a more innovative culture flow from the top down, getting buy-in from all levels of leadership. This research implies that this change will not occur overnight, so to speak, and that moving from hierarchy to adhocracy is one of the more difficult transitions to initiate.

D. INDIVIDUAL RESISTANCE TO CHANGE

In addition to understanding organizational-level barriers, we must also be aware of individual-level barriers. Resistance to change often stems from the individuals whom are expected to implement change. With change comes new challenges that many individuals find unnecessary, making them both hesitant and unwilling to accept change. However, such challenges may be perceived as worse than they actually are, especially if the advantages of the technology do not align with the interests of the individual. Thus, *understanding* what individuals value in new technologies, as well as, how they perceive new technologies will affect *their* values is critical to breaking down those barriers that hinder the adoption of new learning technologies.

Over time, researchers have attempted to employ numerous theories to help understand behaviors concerning technology usage among individual users. Theories such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) serve as the foundation for today's most prevalent model, the Technology Acceptance Model (TAM).

1. Theory of Reasoned Action

The TRA, as seen in Figure 3, links psychological components, such as attitudes, beliefs, intentions, and subjective norms to an individual's behaviors (Silva, 2015). According to the TRA, "attitudes are informed by salient beliefs, or beliefs concerning specific attributes or consequences of the element evaluated that a person believes to be most important" and "people rely on their subjective, and sometimes biased, beliefs to form their evaluation of objects" ("Theory of Reasoned Action," n.d., p. 2). Furthermore, attitudes and the pressures associated with subjective norms are major motives behind intentions (Silva, 2015). Subjective Norm (SN) is defined as the "degree to which an individual believes that people who are important to her/him think she/he should perform the behavior in question" (Morris, 2000, p. 119). Although the TRA was not specifically created with the intent to assess acceptance of technology, it is believed that the TRA can still be applied to the study of technology acceptance and resistance (Silva, 2015).

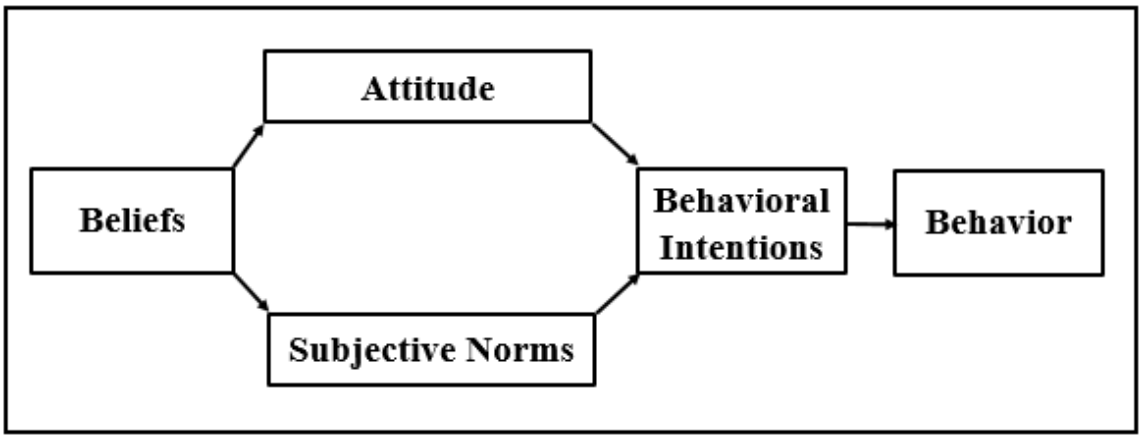

Figure 3. Depiction of the Theory of Reasoned Action.
Adapted from Silva (2015).

2. Theory of Planned Behavior

The TPB, as featured in Figure 4, is simply an "extension of the Theory of Reasoned Action" (Al Maskari, 2015, p. 238) with the addition of and strong concentration on "perceived behavioral control" (PBC) (Silva, 2015, p. 208). Steinmetz, Davidov, and Schmidt (2011) define PBC as "the perceived availability of opportunities and resources to perform the behavior" (p. 97). Moreover, intention, particularly pertaining to an individual's willingness to carry out a specific behavior, is a principal component of the TPB (Steinmetz et al., 2011). Human behavior and intention are influenced by three notions: behavioral beliefs, normative beliefs, and/or control beliefs (Kim & Kankanhalli, 2009; Silva, 2015). Behavioral beliefs refer to both the negative and positive dispositions formed by one's evaluation of the expected outcomes of said behavior (Al Maskari, 2015; Kim et al., 2011; Jung, Cerreto, & Lee, 2010). In other words, behavioral beliefs are associated with attitudes (Al Maskari, 2015). Normative beliefs encompass how the individual thinks the behavior will be accepted by others, i.e., their peers or superiors, and the level of motivation they are willing to devote to meeting such norms to obtain such approval (Kim et al., 2011; Jung et al., 2010). Conceivably, normative beliefs go hand-and-hand with subjective norms (Al Maskari, 2015). Control beliefs are how and to what extent users believe the system will assist or interfere with their performance (Kim et al., 2011). Thus, control beliefs are connected to perceived behavioral control (Al Maskari, 2015).

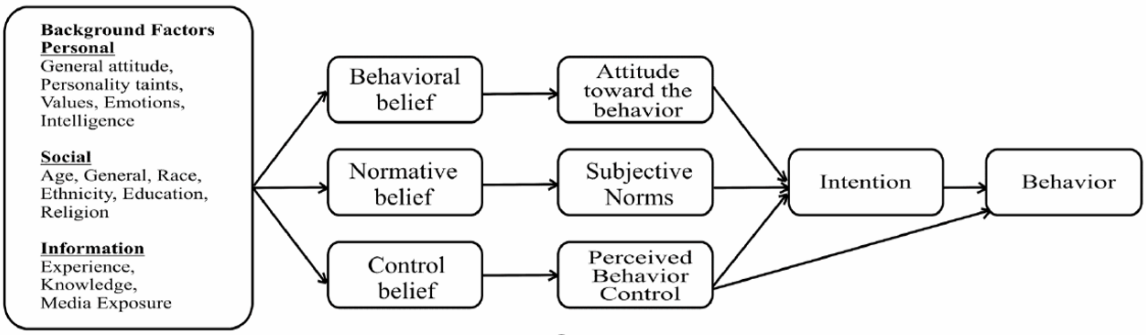

Figure 4. Depiction of the Theory of Planned Behavior.
Source: Al Maskari (2015).

3. Technology Acceptance Model

Due to technological advances, Fred Davis developed the TAM, a model specifically geared toward the study of technology acceptance and usage, from the TRA and TPB (Silva, 2015; Cheng, 2017). More specifically, the TAM was designed to understand the causal relationship between the two concepts (Silva, 2015). With that being said, the TAM attributes perceived usefulness (PU) and perceived ease of use (PEOU) as the two primary determinants of technology acceptance (Silva, 2015). Davis defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Furthermore, with respect to PEOU, it is important to note that "effort" is a limited resource that an individual may divide amongst his/her responsibilities (Davis, 1989). According to Cheng, PU and PEOU are the "behavioral beliefs of attitudes toward the behavior" (as depicted in the figure below) (Cheng, 2017, p. 002). Thus, if an individual believes that a particular technology will yield positive results regarding PU and PEOU, that is if it enhances job performance or reduces effort, they will use said technology (Silva, 2015). Although both PU and PEOU significantly impact technology adoption and implementation, studies have shown PU plays a stronger role in technology *usage* than PEOU (Davis, 1989). Users are more likely to *use* a system based on what the system is capable of doing for them over how easy or difficult the system makes it for them to perform said capabilities (Davis, 1989). Similar to the behavioral, normative, and control beliefs in the TPB, PU and PEOU are also predictors of *intention* to use technology (Kim et al., 2011). Typically, individuals form such *intentions* when they believe that the technology will improve their job performance (Silva, 2015). Due to its technological nature, the TAM is one of the most widely used models for exploring the topic of technological adoption (Silva, 2015). Some research suggests that "the TAM may be more powerful than the TPB in explaining the personal use of technology, while the TPB may be preferred to the TAM in technology uses involving collaboration" (Cheng, 2017, p. 002).

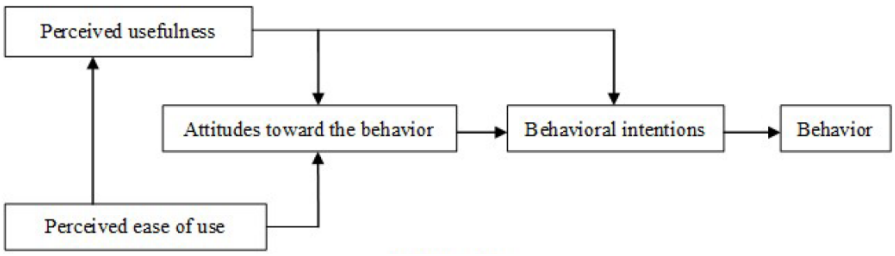

Figure 5. Depiction of the Technology Acceptance Model.
Source: Cheng (2017)

E. STATUS QUO BIAS THEORY

1. Status Quo Background

Another theoretical framework that has congruent ideas with organizational and individual theoretical frameworks is Status Quo Bias (SQB) Theory. This framework delves more, than CVF and TAM, into the psychological, subconscious, and cognitive reasons for resistance behaviors. According to Karahanna and Polites (2012), SQB expounds upon the "explanations for why an individual may remain in a status quo state even in the presence of better alternatives" (p. 22).

2. Inertia

This rigid adherence to the status quo can be due to several reasons, including inertia, convenience, habitual use of incumbent system, or government policy (Samuelson & Zeckhauser, 1988). Inertia is defined by Polites and Karahanna (2012) as, "attachment to, and persistence of, existing behavioral patterns (some of which are habituated) even if there were better alternatives and incentives to change" (p. 22) and "rigid continuance of the status quo" (p. 24). Similarly, Rey-Moreno and Medina-Molina (2017) describe inertia as the dissatisfaction and unwillingness to "abandon a situation" (p.175). It is believed that inertia occurs due to a variety of factors including "spontaneous habits, professional norms, education, training, precedents, traditions, and rituals as well as through formalized procedures" (Fredrickson & Iaquinto, 1989, p. 518). There are three categories of inertia: affective-based, behavior-based, and cognitive-based (Karahanna & Polites, 2012). Affective-based inertia exists when individuals continue using a system out of comfort,

enjoyment, and/or a strong emotional attachment (Karahanna & Polites, 2012). Such material connections make it stressful for users to change (Karahanna & Polites, 2012). Behavior-based inertia suggests that individuals put little to no thought into their decision to use a system as they typically continue using it merely because it is what they have always done (Karahanna & Polites, 2012). Cognitive-based inertia, on the other hand, suggests that individuals willingly continue to use a system despite the known fact that it may not be the most efficient or effective system for completing tasks (Karahanna & Polites, 2012). Rey-Moreno and Medina-Molina (2017) assert that "people guided by inertia avoid seeking variety and innovation" (p.175). In relation to TAM, inertia can lead individuals to negatively perceive ease of use of technology, giving way to sticking with the status quo and reducing the likelihood of using new technology (Karahanna & Polites, 2012; Samuelson & Zeckhauser, 1988).

3. Habit

A subconscious source of status-quo behaviors and attitudes stems from incumbent system habit which refers to "incumbent system use that has become an automatic response for obtaining specific instrumental goals" (Karahanna & Polites, 2012, p. 22). The fact that this behavior is subconscious implies that habit can mean individuals are not aware of their behavior. Additionally, habit is viewed as an "unconscious source of inertia" (Rey-Moreno & Medina-Molina, 2017, p. 176). Habits are defined by Rey-Moreno and Medina-Molina (2017) as "automatic behaviors" (p. 175). In other words, habits are learned responses to particular signals which function to achieve specific aspirations (Rey-Moreno & Medina-Molina, 2017; Karahanna & Polites, 2012). In terms of information systems (IS), habits occur as a result of learning (Rey-Moreno & Medina-Molina, 2017). Habit is exacerbated by increased duration that is the longer an individual is a member of an organization the more likely they will begin substituting habit for thinking and decision-making (Fredrickson & Iaquinto, 1989).

4. Mechanisms of Status Quo Bias

Karahanna and Polites (2012) further discuss three mechanisms of status quo bias, rational decision-making, psychological commitment, and cognitive misperception. Figure

6 below illustrates an overarching view of the mechanisms of status quo bias as described in detail in the ensuing sections (Kim & Kankanhalli, 2009).

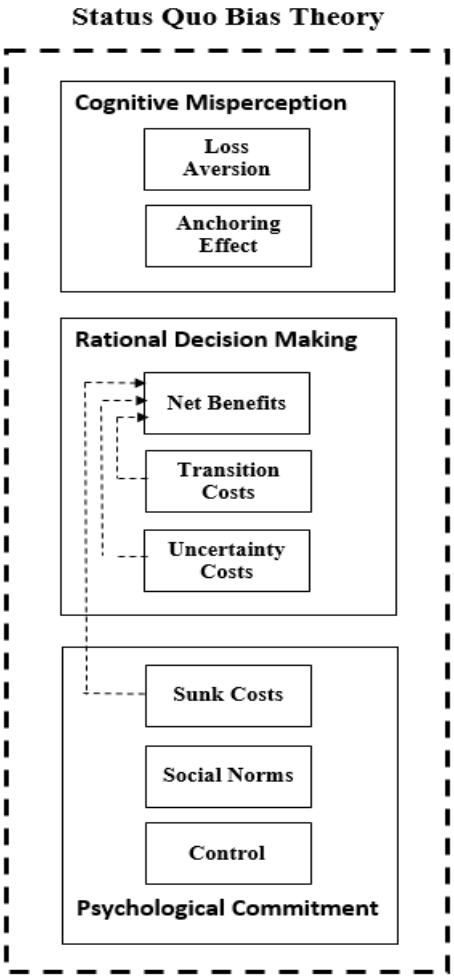

Figure 6. Status Quo Bias Constructs. Adapted from Kim & Kankanhalli (2009).

a. Rational Decision Making

The first mechanism of status quo bias, rational decision-making, is when management makes a decision based on an assessment of the costs and benefits associated with the change (Karahanna & Polites, 2012). Such costs can be classified as either transition costs or uncertainty costs (Rey-Moreno & Medina-Molina, 2017). Transition costs refer to the direct costs of implementing a change, whereas uncertainty costs are the

perceived costs of making such change (Rey-Moreno & Medina-Molina, 2017). If the perceived transition costs outweigh the benefits, managers will choose to remain with the status quo and impede technology acceptance (Kim & Kankanhalli, 2009; Samuelson & Zeckhauser, 1988). Since the judgement of whether to accept the technology is based on perceived costs, this implies that individuals could remain with the status quo, even if the new system is better than the old system, simply because the decision maker perceives that the transition cost of having of learning a new technology (Karahanna & Polites, 2012). Managers may also factor in the perceived risk of making a change, and this "uncertainty can lead to status quo inertia" (Samuelson & Zeckhauser, 1988, p. 34).

b. Cognitive Misperceptions

The second mechanism of status quo bias, cognitive misperceptions of loss aversion and anchoring effect, is when decision-makers perceive costs as more significant than they actually are because they are weighting small costs more heavily than benefits (Samuelson & Zeckhauser, 1988; Rey-Moreno & Medina-Molina, 2017). This misperception can create bias toward the status quo even if the costs are significantly less than the benefits that can be realized, diminishing the appearance of a relative advantage to the new technology (Karahanna & Polites, 2012). Anchoring effect comes from "a bad cognitive interpretation which impacts the users' perceptions and their resistance" (Rey-Moreno & Medina-Molina, 2017, p. 176).

c. Psychological Commitment

The final mechanism of status quo bias, psychological commitment, is when managers are hesitant to make a change because they irrationally factor in sunk costs and attempt to validate previous commitments (Samuelson & Zeckhauser, 1988). Thus, the three primary components of psychological commitment are "sunk cost, social norms, and efforts to feel in control" (Kim & Kankanhalli, 2009, p. 569). Sunk cost refers to "an individual's reluctance to 'cut their losses,' and a tendency to justify previous commitments to a course of action (good or bad) by making subsequent commitments" (Karahanna & Polites, 2012, p. 27). With respect to IS, sunk costs may include factors such as required learning efforts or system experience and expertise (Rey-Moreno & Medina-Molina,

2017). Social norms are established practices and beliefs, regarding change, that are dominant in the workplace (Kim & Kankanhalli, 2009). Finally, according to Samuelson and Zeckhauser (1988), assertiveness and decision-making enhances an individual's feeling of being in control. Rey-Moreno and Medina-Molina (2017) also attribute regret aversion to psychological commitment. Regret aversion is when individuals fear making certain decisions because previous negative experiences have driven them to believe that the new situation will result in regret (Rey-Moreno & Medina-Molina, 2017).

5. Experimental Evidence

Evidence from research found that, of participants in a study of status quo bias, "Most...seemed unaware (and slightly skeptical) that they personally would fall prey to" status quo bias (Samuelson & Zeckhauser, 1988, p. 9). This goes to show that individuals and even organizations may be unaware of a status quo mentality and biases cause by subconscious perceptions. Building upon this idea, organizations may not consciously perceive that they are not fostering an environment for innovative and creative thinking.

F. ORGANIZATIONAL AND INDIVIDUAL BENEFITS FROM LEARNING TECHNOLOGIES

The final portion of the literature review is geared toward investigating the potential behavioral, learning, or job performance outcomes that emerging technologies have to offer. This is important to understand, in the overall context of the study, to further motivate organizations and individuals to accept learning technology, vice maintaining the status quo. Research suggests that many benefits can be harnessed with the incorporation of learning-centered technology. This section makes reference to technology-mediated learning; the definition that our study subscribes to is "the use of computers and other information technologies as an integral part of the learning process," including "computer-based instruction, Internet-based instruction, and other methods for customized learning" (Karoly & Constantijn, 2004, p. 121). Due to their similar nature of use in research, this report also uses the terms e-learning and technology-centered learning synonymously with technology-mediated learning. The following paragraphs describe in detail, the potential organizational and individual level benefits, comparability to traditional learning methods,

and important relationship between technology resistance and the potential benefits of technology-mediated instruction.

1. Organizational Benefits

One important organizational benefit to the adoption of e-learning is enhanced speed to capability, providing for lowered training time and cost (Pantazis, 2002). Next, studies have shown that organizations can lower travel and labor costs and reduce the size of required education and training infrastructure (Ruiz, Mintzer, & Leipzig, 2006). Furthermore, many learning-centered technologies can be made available for use at all times, across all geographical distances, thereby reducing the need to transport individuals to one location for face-to-face instruction, lowering training costs (Pantazis, 2002). Often times, organizations get wrapped up in the potential cost saving benefits of shifting to technologies; however, it is important to consider the benefits to the individual.

2. Individual Benefits

One benefit already realized by some Navy personnel was revealed in Virtual Schoolhouse (VSH) surveys conducted by Aten and DiRenzo (2014) at the Navy's Submarine Learning Center where they found individuals liked the benefit of increased spare time due to reduced travel time, in other words, improved quality of life. Next, Spears (2014) cited research relating increased learner control and improved academic performance and satisfaction from the use of virtual environments. In other words, individuals appear to enjoy the ability to learn more at their own pace. Another feature offered with most technology-mediated learning is some form of collaborative learning built into the system. Research shows that fostering these types of learning interactions makes individuals more interested in learning (Alavi & Leidner, 2001). Furthermore, improvement in interest in learning is due to the fact that many learning technologies available offer a large degree of customization capabilities, allowing for tailored programs to meet the needs of many different types of learners (Pantazis, 2002; Ruiz et al., 2006). As referenced in the organizational benefit section, the readily available nature of learning technologies is also a benefit on the individual level, evident by student appreciation (Aten & DiRenzo, 2014; Karoly & Constantijn, 2004). These benefits could be extremely

valuable to the Navy, in terms of optimizing manpower, personnel use, and training. However, as previously mentioned, it is important to note that even though literature points to these potential affordances of technology in the civilian sector, it is unclear as to how some of these benefits will transition in the military context or if the Navy culture will foster an environment capable of taking advantage of these potential outcomes.

3. Success of Technology Adoption

Research in virtual learning environments and at the VSH indicates that there are learning-centered technologies available that are more than adequate alternatives to traditional face-to-face classroom learning (Piccoli, Ahmad, & Ives, 2001; Aten & DiRenzo, 2014). While research demonstrates the benefits of and viability of technology-mediated learning, it is of vital importance that organizational leadership understand that performance improvements or gains in learning or behavioral outcomes from the use of learning technologies is not a guarantee (Caporarello, Magni, & Pennarola, 2016). Caporarello et al. (2016) describe learning technology adoption as "an opportunity to generate benefits" (p. 2). As research indicates, acceptance, integration, and adoption is key for the success of technology-mediated learning. For example, Caporarello et al. (2016) state, "...new method improves students' performance only if...the actors of the school environment are willing to embrace the change and be an active part of it" (p. 9). Furthermore, open and positive attitudes and behaviors toward the adoption of learning technology are crucial to the success of VLE (Bower & Richmond, 2016). Finally, analogous to the recommendations for shifting a hierarchical organization to an adhocracy, leadership needs to be a prime motivator for the investment in learning technology and innovation, in order to fully leverage the benefits received from said technology (Pantazis, 2002). Pantazis (2002) further states, "For government, the challenge is to create a supportive policy environment that encourages access to e-learning" (p. 25).

G. SUMMARY OF LITERATURE REVIEW

Research provides evidence that the adoption of technology in organizations can be greatly affected by the behaviors, attitudes, values, and perceptions deeply rooted within an organization due to its culture type, processes, and structure, as well as, behaviors

inherent in individuals based on their own personal beliefs and perceptions. The CVF for diagnosing organizational culture implies hierarchical organizations are likely to inhibit innovation and technology adoption. Three frameworks dominate the literature pertaining to technology acceptance at the individual-level: the TRA, the TPB, and the TAM. The TAM, however, is one of the most widely accepted and used tools for studying this topic as it specifically aims to understand human behavior as it relates to technology (Silva, 2015). That being said, technology adoption is driven first by perceived usefulness and secondly by perceived ease of use (Davis, 1989). Congruent with the content of organizational and individual level research, the study of status quo bias theory expounds upon the cognitive and psychological motives behind user resistance. Furthermore, while many emerging technologies prove beneficial in the civilian market, there is a caveat to achieving improved learning outcomes, which is successful adoption and implementation. Chances are, if the organizational and individual are not ready to accept it, any adoption attempt will not see the full potential of the learning technology.

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III. METHOD

A. PURPOSE

The research included analysis of the in-person interviews of NPS Navy students and military faculty and surveys of enlisted personnel. Both types of data were explored using thematic analysis, comparing thematic trends within and across groups, such as leaders, users, and subject matter experts in Navy education and training. The purpose of administering surveys to officer and enlisted personnel was to gather data on a representative sample of the overall Navy population concerning perceptions and attitudes toward the use of learning-centered technologies. The interviews of officer personnel enabled further elaboration on themes discovered through the administration of surveys. The purpose of utilizing NPS Navy students for interviews was to collect data from a broad range of communities and perspectives, to minimize the risk of bias. Additionally, interviewing officers helped shed light on whether Navy processes, policies, culture or environment might influence the adoption and use of new learning technologies and what, if any, unique technological and organizational barriers are inhibiting the adoption of new technologies.

B. SETTING

The surveys were obtained from two separate samples. The first sample consisted of officers, whereas, the second sample consisted of enlisted personnel. For the officer sample, NPS Navy students were emailed and administered the surveys via electronic means (LimeSurvey). Thus, students filled out the surveys in an environment of their choice. For the enlisted sample, site visits were conducted to administer paper-surveys to new enlistees who recently completed A-school at Training Support Center (TSC) in Great Lakes, Illinois.

The interviews were conducted at the NPS campus. The majority of the interviews took place in a secluded, private room in the Dudley Knox Library to ensure anonymity of interviewees. Select interviews took place in faculty offices that were also secluded. All interviews were audio recorded and transcribed.

C. SURVEY

The survey questions were developed using Aten and DiRenzo's (2014) survey questions from their study, "Assessing the potential of virtual worlds for Navy Training and Education: cognitive learning processes and outcomes in the virtual school house (VSH)." These survey questions were used as a starting point and then adapted to enable evaluation of Navy enlisted and officer attitudes and perceptions of the adoption and use of learning-centered technologies. Questions were adjusted or added to be in alignment with the theoretical frameworks discussed in our literature review, to allow us to identify resistant attitudes, behaviors and themes throughout the data.

The sample of 139 enlisted personnel was comprised of the following ranks: 5% E-1, 16% E-2, 49% E-3, and 30% E-4. Additionally, the sample of enlisted personnel was comprised of the following age ranges: 25% 17–19, 60% 20–24, 14% 25–29, and 1% 30–35. The sample of 92 officers was comprised of the following ranks: 2% ENS, 4% LTJG, 70% LT, and 24% LCDR. Also, the sample of officers was comprised of the following age ranges: 1% under 25, 33% 25–29, 33% 30–34, 27% 35–39, and 7% over 40. The officer survey questions administered to the NPS student population were adapted from the enlisted survey conducted at TSC in Great Lakes. The officer surveys were modified, from the enlisted survey questions, to include questions that were relevant from the officer's perspective as mid-level leaders of enlisted personnel, while the enlisted personnel surveys were geared toward their perspective toward their supervising leadership. The enlisted personnel survey is provided in Appendix A, and the officer personnel survey is provided in Appendix B.

D. INTERVIEWS

At the same time as the survey distribution, NPS Navy students and military faculty were recruited to participate in face-to-face interviews via in-person socialization of research and emails describing the purpose of this study. Prospective participants were informed that interviews would be recorded and transcribed for use in this study and asked to sign a consent form. Additionally, they were informed that the interviews would be soliciting their opinions of and experiences with learning technology adoption. Twenty-

three potential participants were asked to participate in the study. All participants agreed and signed the consent form.

Navy student participants included officers from a broad array of designators. A semi-structured interview was designed to prompt responses that would allow elaboration of the organizational and individual resistances discovered in prior research, discussed in the literature review. Participants were asked to respond to a preset list of 16 questions but were encouraged to elaborate on their specific experiences and attitudes beyond the preset questions. The interview questions are provided in Appendix C. Individual interviews lasted from 14 to 51 minutes, resulting in a total of 703 minutes (~12 hours) of audio recording and 276 pages of written transcripts.

We coded to identify themes. First, we read each transcript to familiarize ourselves with the content. We recorded our impressions in written notes and memos. We then reread each transcript and selected and grouped segments of text into thematic categories. We began with 10 categories derived from our literature review: organizational resistance, perceived ease of use, perceived usefulness, status quo bias, inertia, habit, rational decision-making, psychological commitment, cognitive misperception, and benefits of technology. We then added additional thematic categories we identified in the data. This coding resulted in 143 segments of text grouped into 16 thematic categories. The complete coded segments are shown in Appendix D along with the recommendation quotes. The segments of text ranged between 1 and 7 lines. Finally, we organized the coded segments of text into organizational-level and individual-level themes and displayed the text in tables.

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IV. FINDINGS

A. EXPERIENCE WITH TECHNOLOGY

1. Mobile Technology Experience and Usage

Figures 7 through 11, displayed in this section, summarize participants' responses to survey questions about frequency of use of and experience with mobile learning technology and smartphones in their day-to-day lives.

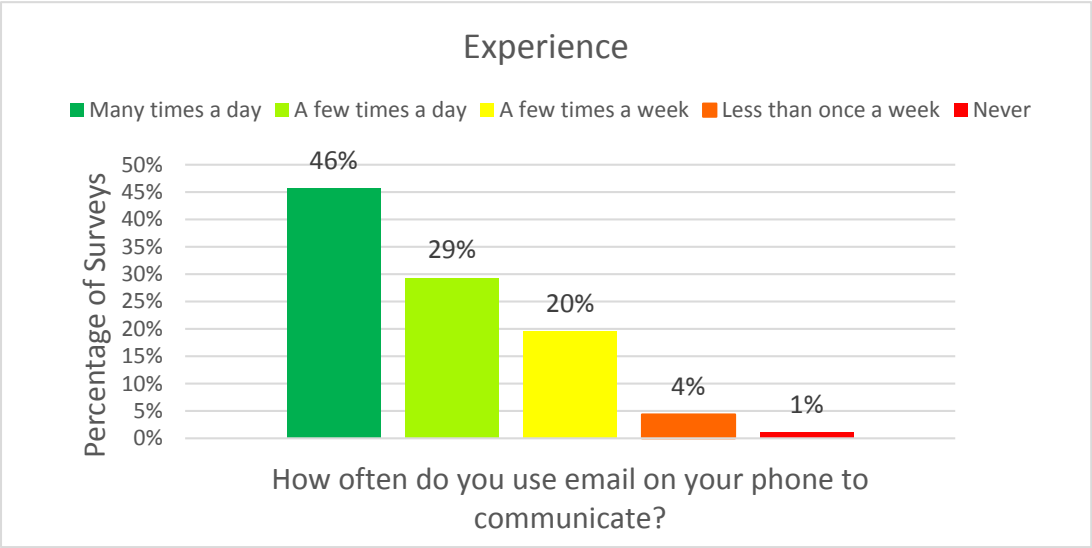

Figure 7. Officer Use of Mobile Technology for Email Communication

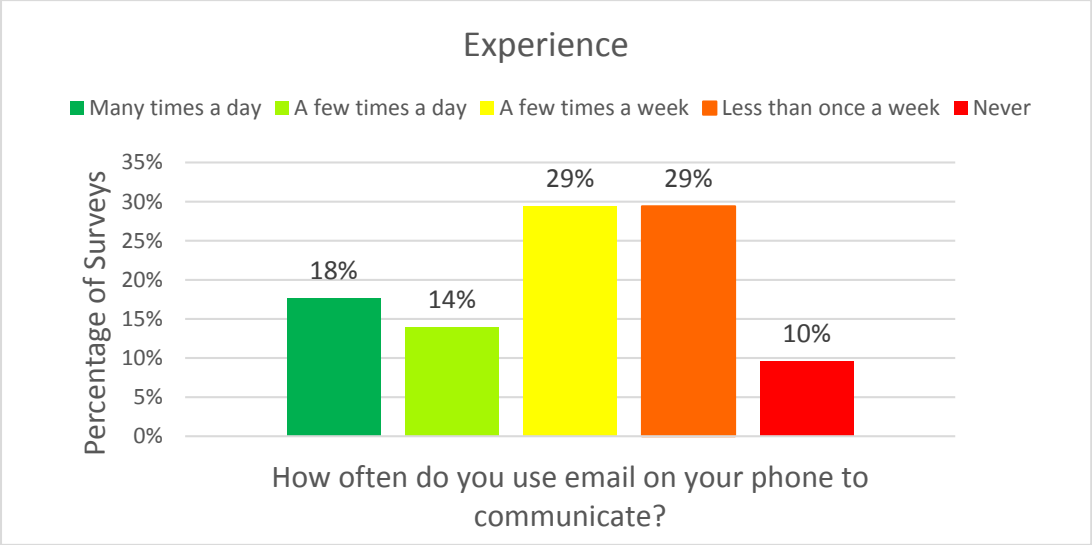

Figure 8. Enlisted Participant Use of Technology for Email Communication

As shown in Figure 7, 75% of the officer participants use email on their phones to communicate daily, with the majority using email on their phones many times a day. As shown in Figure 8, while the officers use email on their phones to communicate many times a day, most enlisted participants only use email on their phones only a few times a day or less than once a week, with 10% never using it. This could be due to environmental factors, for example, the officer students at NPS are allowed to have their phones with them, whereas the enlisted students may not be able to have their phones readily available in A-school. On the other hand, this could be indicative of a generational communication change, such that the younger generation is leaning more toward other means of communication that provide instant gratification, such as Twitter, Instagram, and Snapchat.

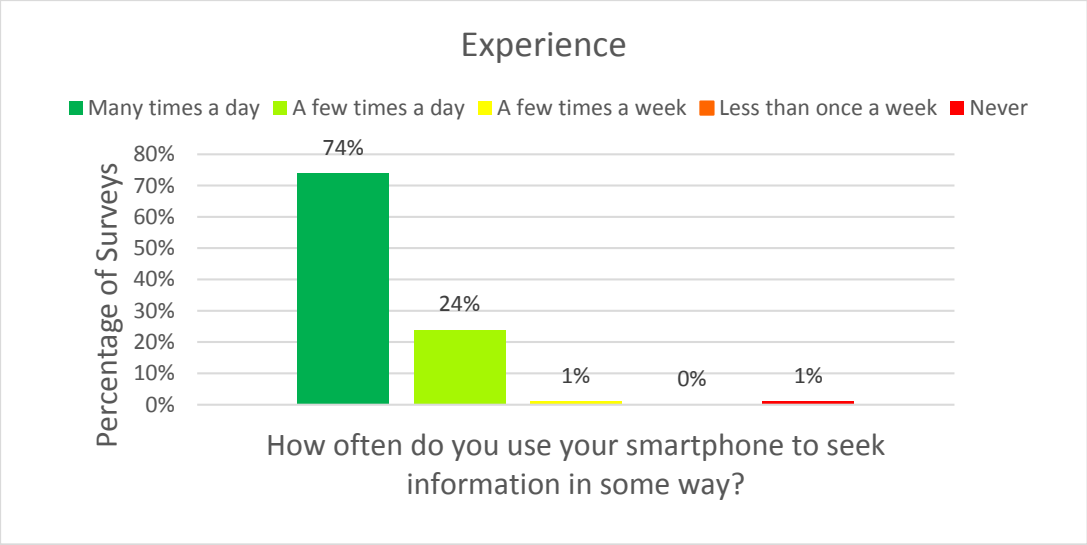

Figure 9. Officer Use of Mobile Technology for Information

Figure 9 shows that 98% of the officers in this study use their smartphones to seek information daily, with the clear majority indicating that they use their smartphones to seek information many times a day. Officers and enlisted indicated a very daily use of their smartphones for text messaging, internet searches, or a general purpose. However, while officers use mobile technology daily to text, email and search the internet, they are not using these devices as frequently for learning.

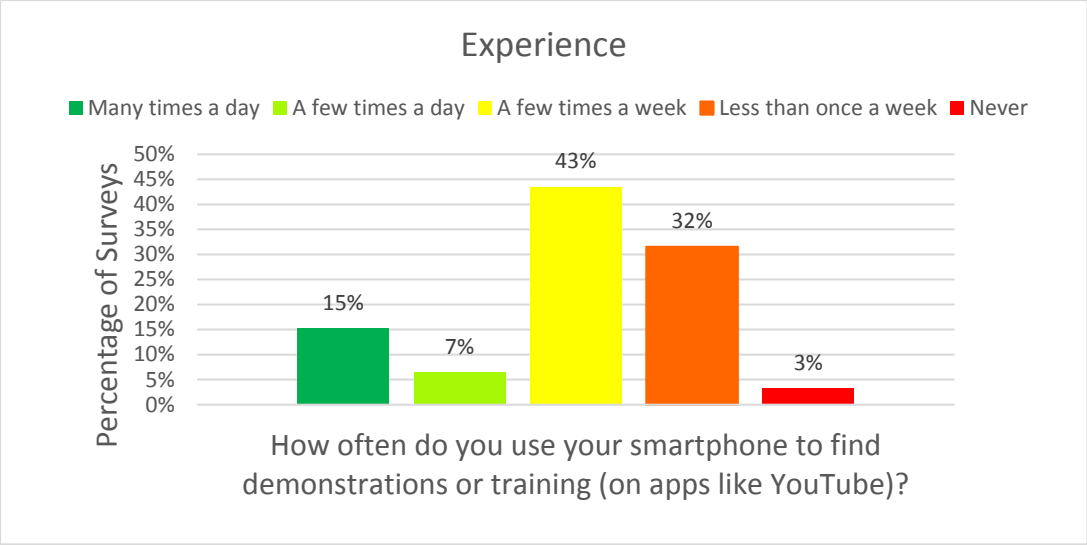

Figure 10. Officer Use of Mobile Technology for Demonstrations

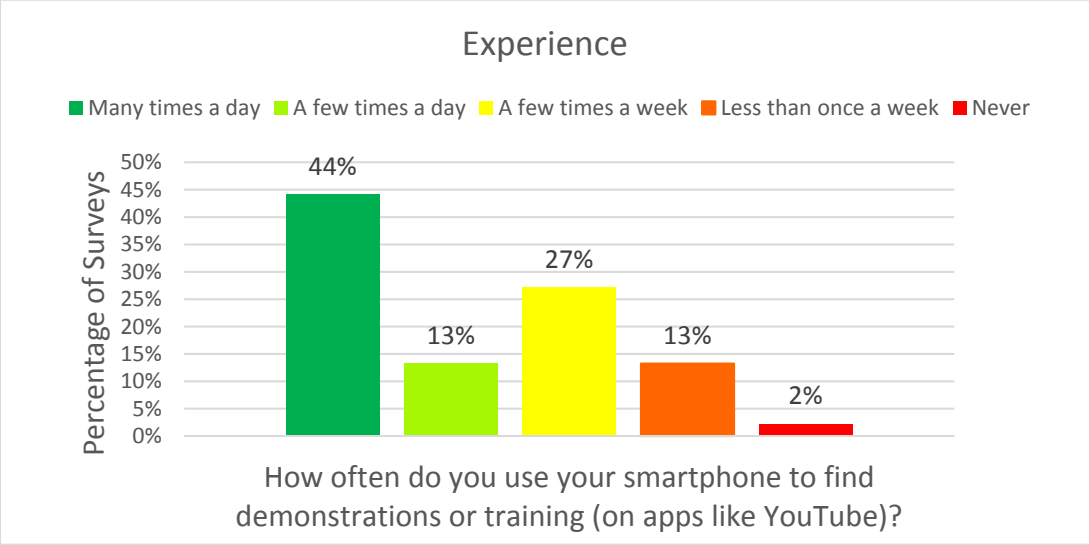

Figure 11. Enlisted Participant Use of Mobile Technology for Demonstrations

As shown in Figure 10, the data indicate that officers mostly use their smartphone to find demonstrations and/or training on a weekly basis. Figure 11 shows that unlike the officers, 57% of enlisted participants use their smartphones to find demonstrations and/or training daily, for example, learning from YouTube videos. This could be indicative of a generational difference in preferences toward learning medium.

2. Openness toward Technology

As shown in Figure 12, the data indicate that 78% of officer participants at least agree, with the majority strongly agreeing, that they like experimenting with new information technologies. This is indicative of an overall openness to experimenting with and using new technologies.

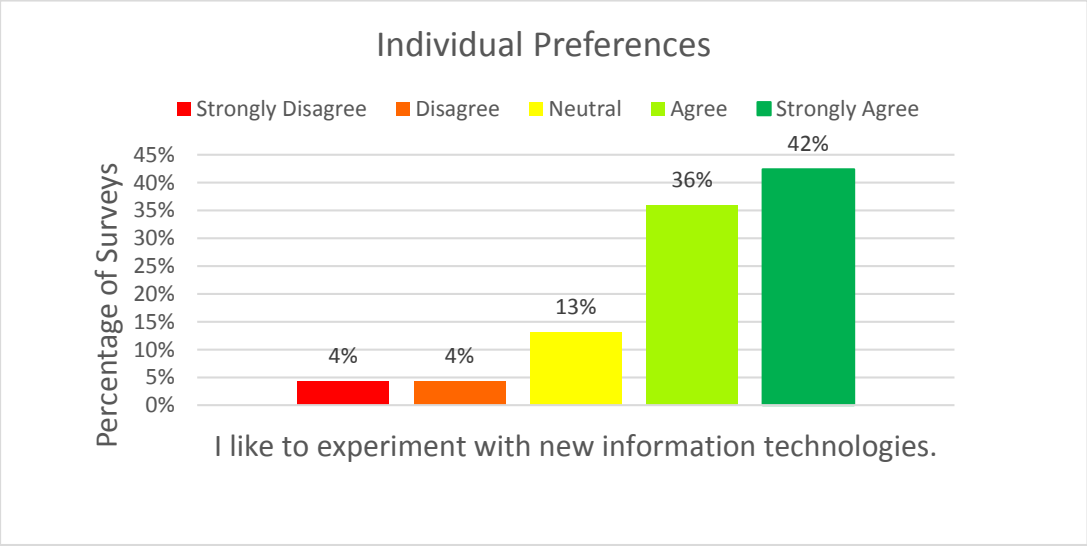

Figure 12. Officer Experimentation with New Technologies

B. ORGANIZATIONAL CULTURE RESISTANCE

1. Expectations for Organizational Assistance with Technology Use

Figure 13 and 14, shown below, show the percentage of responses indicating agreement or disagreement to questions designed to illuminate participants' expectations for organizational assistance and training to effectively use technology.

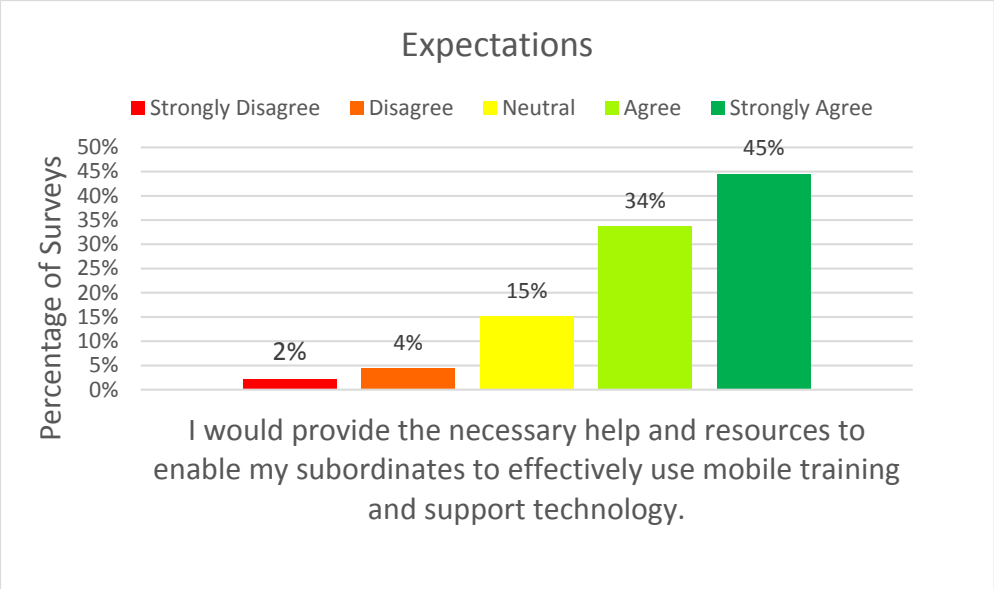

Figure 13. Officer Expectations for Support and Resources for Technology

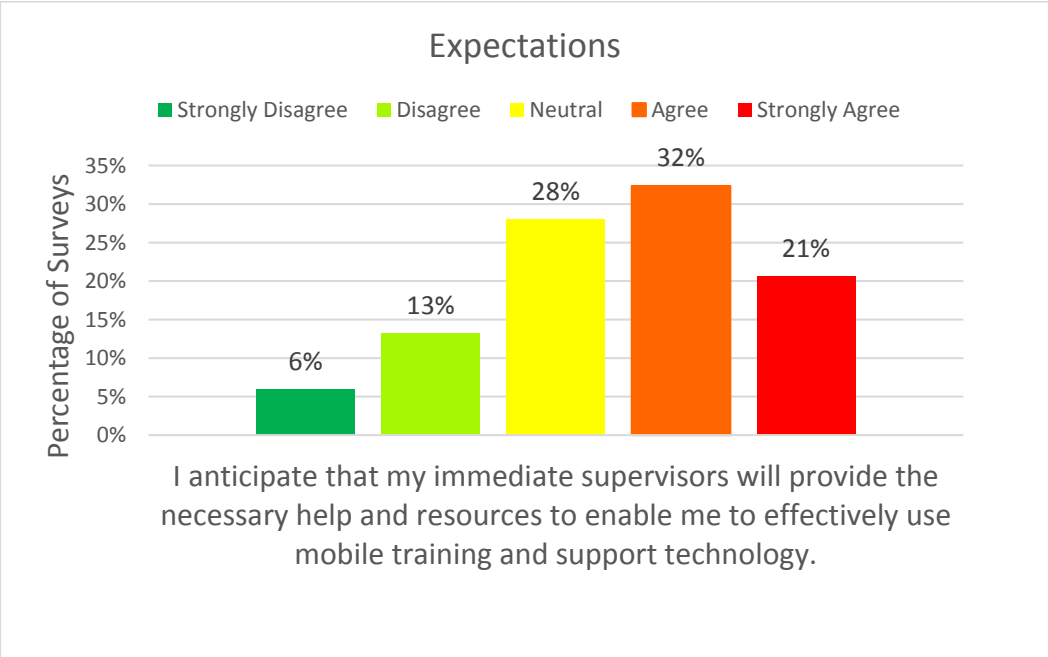

Figure 14. Enlisted Participant Expectations for Support and Resources for Technology

As shown in Figure 13, the data indicate that 79% of officer participants at least agree, with the majority strongly agreeing, that they would provide necessary help and resources to their subordinates. However, as shown in Figure 14, the data indicate that only 53% of enlisted respondents at least agree, while almost a third feel neutral or are unsure as to whether their immediate supervisors will provide them with the necessary help and resources to effectively use mobile technology for training. A similar question yielded the same results, indicating a difference in perspectives. The mid-level officer leaders believe they would be responsive in assisting their subordinates, whereas the enlisted survey participants appear to have a less optimistic view of the support, assistance, and resources that will be provided by these immediate supervisors.

While the survey data revealed that enlisted participants show concern as to whether their immediate supervisors (mid-level leaders) will provide them with the necessary resources for technology implementation and use, several officer interviews indicated mid-level leaders are also concerned they would not have sufficient resources. Specifically, there was concern that technology implementation would not be facilitated by adequate training to operate the technology or organizational support for troubleshooting bugs in the system. With regard to a personal experience with insufficient training and technology support, one interviewee commented, "…because of its hardware/software failures, it didn't offer...any benefit toward our fast cruise process...we don't have any ITs trained to use it yet, so it kind of just slowed down the whole process when everybody was trying to figure out how to get past those errors..." With regard to organizational support for technology implementation, another interviewee stated, "…you definitely had to have a qualified civilian sitting at the console all the time...running the machine..." As indicated in Table 1, interviewees identified insufficient organizational support resources as an area of implementation that creates resistance. Table 1, in the next section, provides additional impactful interview quotes that further emphasize these perspectives. Furthermore, Appendix D provides a comprehensive list of additional quotes that further support these findings of this study.

2. Expectation for Organizational Acceptance of Technology

Figure 15 shows a majority of officer's perspectives indicate an openness toward incorporation of mobile learning technology. While previously discussed questions indicate an overall openness to experimentation with technologies, only 50% disagree or strongly disagree with opposing the change toward this new way of delivering training. Furthermore, an additional question yielded similar results but with a more neutral feeling about support for the change to using mobile technology for learning. The enlisted survey participants' views seem to echo this idea that they mostly feel unsure or neutral about their supervisors' support for mobile technology change. This could explain why they felt unsure as to whether they would receive the necessary resources and support from their supervisors. Also, notable is that it seems as though an openness to experimentation with technology, discussed previously, would be followed up by a stronger position on accepting the change toward using technology; however, this was not the case. This may be due to the PEOU and PU of technology discussed in the next section.

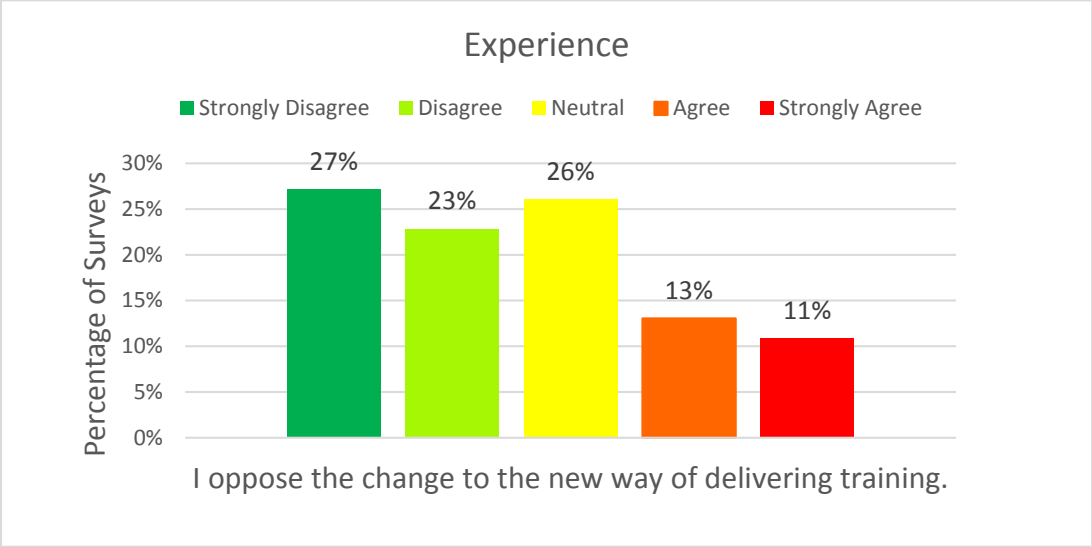

Figure 15. Officer Participant Opposition to Mobile Technology Change

Figure 16 shows that 47% of officers believe that the Navy supports a change toward mobile training technology, with 32% neutral or unsure. On the other hand, Figure

17 indicates that 56% of enlisted participants agreed that they believe in the Navy's support, while 32% are either unsure or feel neutral. As compared to the mid-level officer leaders, the enlisted survey participants appear to be slightly more optimistic of the Navy's support for a change involving technology adoption, while being more skeptical of their immediate leadership. Next, we analyze data from the interviews that elaborates on additional themes of organizational resistance.

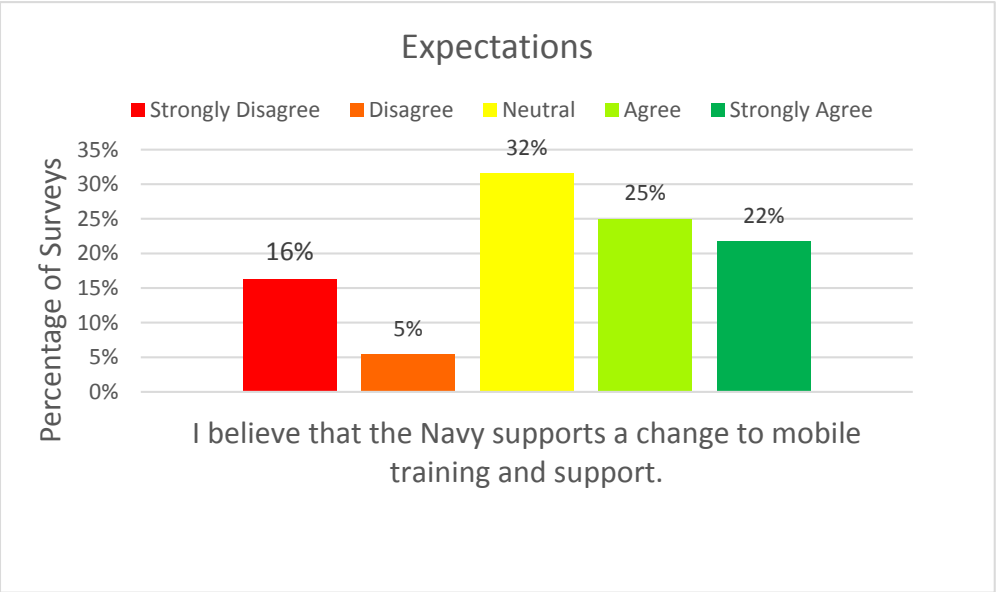

Figure 16. Officer Perception of the Navy's Support of Mobile Learning Technology

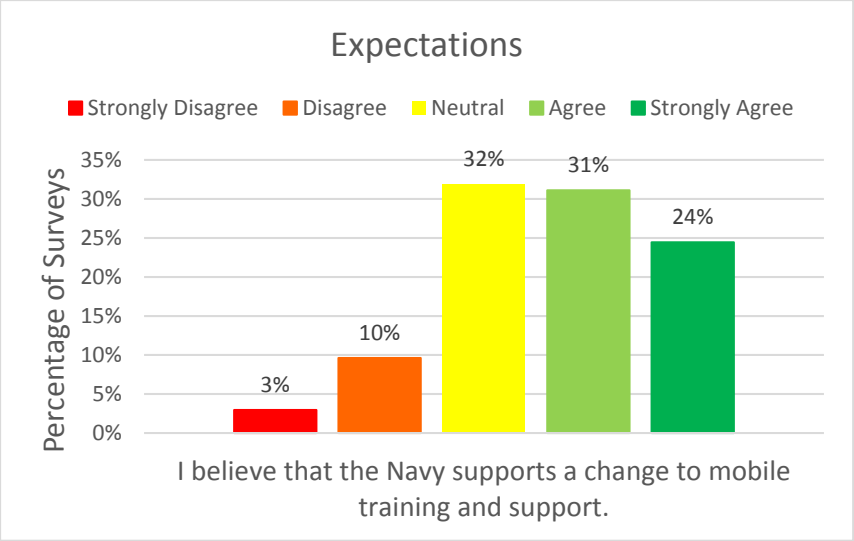

Figure 17. Enlisted Participant Perception of the Navy's Support of Mobile Learning

a. Generational Culture Differences

Around half of the interview subjects identified aspects of Navy culture as a major obstacle that creates resistance to technologies. Specifically, participants noted resistance in senior ranks or older generations, which participants described as less technologically savvy, stuck in their ways, and not fostering innovation. For instance, one interviewee stated, "I think our culture is inhibiting…I think we all have experienced elements of where innovation has been inhibited justly or unfairly…innovative efforts …are squashed…" With respect to the generational differences in culture, another subject mentioned, "There are more younger sailors, more apt to using technology and understanding of the benefit it has in their lives and how it can be utilized for training." Additionally, an interviewee explained, "…it's the older generation that again produces resistance to learning. If I have been using one system for the majority of my career, which could be over ten years, I am not going to want to change…" This officer interview data overall indicated the perception of openness to technology adoption in the younger generations and rigidity and resistance in the older generation. This idea correlates to the findings from analysis of the survey data, which showed that officers were less optimistic about big Navy's support of technology adoption.

b. Zero-Defect Mentality

Highly related to Navy culture is what is referred to as the perceived zero-defect mentality, creating risk aversion, challenging the norm, and being innovative. For example, one interview participant stated, "I think we have a zero-defect mentality in general, with anything we do. We will try something, and if it doesn't work, we will scrub it ...Instead of tweaking it and saying how can we still make it interactive, it just didn't work, so they said no ...It's hard for leaders to say I am trying to fix it. Give me more money, give me more time." Furthermore, an interviewee explained, "There are so many ways that leadership hampers implementation and even consideration...after you get to a certain level in your career, it stops being about doing the mission, and it starts being a lot more about what do I need to do to survive, because, in today's zero-point failure mentality, you are not allowed to make a mistake. If you make a mistake, you are axed." The interview data indicated that the zero-defect mentality creates a culture where innovation and risk-taking are hindered for fear of making a mistake or having negative career implications. This could further explain the attitudes in survey data, where officers perceived big Navy's support of technology adoption as lacking.

c. Hierarchy

With a hierarchical government organization, the Navy comes with an inherent bureaucracy and red tape. More than a third of interview respondents indicated that bureaucracy and contracting processes, built into the Navy's hierarchy, inhibit innovation and effective and efficient technology adoption. For instance, interview respondents stated, "The implementation scheme is so antiquated and useless, effectively, that by the time a contract gets cut, something gets developed and put into place, its five years out of date." Another interviewee echoed this attitude, declaring, "...when the Navy says the cutting edge of technology…I just hear 10 to 15fifteen-year process." Furthermore, interview respondents indicated that the political nature of the higher echelons of the major decision-making bodies creates a barrier to the adoption of new technological programs. "I just think it's the bureaucracy...a lot of things about appropriation and the money...it's very political ….it just kind of turns into this bidding war and the bidding war takes forever...LCS was

something they dreamt up of in the late 90s...we just saw the first one in like 2011." Additionally, the hierarchical structure in the Navy creates a discontinuity of perceptions of current technology effectiveness between decision-makers at the top of the hierarchy, who are far-removed from the deckplate, and the perceptions of personnel at the lower levels of the hierarchy. This belief is emphasized by the quote "...in the higher rankings, I think that they think it [NKO] is effective…once you get to...the first tour DIVOs and LPOs, it's very lucid that they are not effective." If personnel on the high end of the hierarchy misperceive the effectiveness of current technology, this could inhibit the search for better, innovative technologies.

d. Budgetary Constraints

Another organizational issue discussed by a more than half of the interview subjects was the perceived impact that budgetary constraints have on organizational resistance and resistance to technology adoption. Some officer respondents seem to believe that even if the value of innovation and technology is shared throughout the ranks of the Navy, there is still a major obstacle to funding innovation research and development because the Navy has been in a state of fiscally constrained resources. One interviewee articulated, "We are functioning on a continuing resolution...We don't have funding for the new projects as long as we have a CR in place...there is definitely a huge political, bureaucratic block that stops that advance." Interview subjects further implied that the lack of budget flexibility forces the Navy to sacrifice the highest quality training for lower cost, less effective alternatives. One interview respondent elaborated, "...when you get into these economic decline periods...making due with what you have, sometimes the quality can suffer and you can kind of see that whenever you get new recruits onboard a ship." Additionally, there seemed to be a perception that the Navy is more willing to sacrifice training funding over operational funding, rather than standing firm against a "Yes man" mentality. One interviewee, as well as others, alluded to this, stating, "We see our budget shrinking, but yet we are still expected to work at the same level or above because we have been programmed to be afraid to say no...we are expected to remain at the same level of readiness until something catastrophic happens like what happened in the PACFLEET area."

e. Environmental Restrictions

The final organizational factor that may be unique to the Navy is environmental restrictions that come into play when personnel are deployed on ships. Interview respondents alluded to the idea that adopting and implementing technology aboard ships is often easier said than done, citing the increasingly complex cyber environment. One interview subject mentioned, "So, I would say mainly it's probably a security issue that prevents them from wanting to use more technology on ships or whatnot." while another explained, "I think before you fund a program, or you have a new start for a new program, [you need to ask] what are the cyber implications ...but also what if it gets hacked? How do we keep it safe?" Furthermore, interview data suggested there may be concerns about the vulnerabilities that come with placing various technologies on ships, which could be a justification for resistance. For example, one interview subject stated, "...[technology adoption] is a vulnerability in a lot of ways...you would have a lot of pushback from a security point of view...would have a lot of people for it and a lot of people against it." Table 1, shown on the next page, provides a detailed list of impactful quotes from each theme that is thoroughly described in the subsequent sections.

Table 1. Organizational Resistance Interview Quotes

Organizational Resistance					
Hierarchy	Budget	Implementation Support	Zero-Defect Mentality	Culture	Environmental Restrictions
"...the organization is a colossus. It takes an enormous amount of time to do anything and it takes us an enormous amount of resources to do anything. It's so delayed due to the size of the bureaucracy to get going." "...The implementation scheme is so antiquated and useless, effectively, that by the time a contract gets cut, something gets developed and put into place, its five years out of date." "...when the navy says the cutting edge of technology, that's like for me, I just hear 10 to 15--year process." "...There is a lot of bureaucracy...there are a lot of levels that you will have to go through to get something like that approved..."	"I think the navy is aware of you know, the value of formal training and everyone's aware of what would be the optimal situation, but of course we have a lot of constraints with time and money." "We see our budget shrinking, but yet we are still expected to work at the same level or above, because we have been programmed to be afraid to say no...we are expected to remain at the same level of readiness until something catastrophic happens like what happened in the PACFLEET area." "So, it was a cost saving measure [switching to SWOS-In-A-Box]. Yes, I am sure it saved thousands and thousands of dollars, but the end result was you had people who weren't trained..." "...when you get into these economic decline	"...the people who were administering the technology didn't know how to use it...That's manpower funding and training problems with that one." "The training, however, was probably an hour, hour and a half long. But, for this to be a major system ...you kind of need multiple days, maybe even multiple weeks to really kind of get the advanced aspects down." "...we don't have any ITs trained to use it yet, so it kind of just slowed down the whole process when everybody was trying to figure out how to get past those errors..."	"I think we have a zero-defect mentality in general, with anything we do. We will try something and if it doesn't work, we will scrub it." "They spent billions on the research and development, the installation, and it's now gone...Instead of tweaking it and saying how can we still make it interactive, it just didn't work, so they said no. That gets done a lot...Because you have to justify the use of money. There is always going to be someone to say well it didn't work, why do we want to spend more money on that. It's hard for leaders to say I am trying to fix it. give me more money, give me more time..." "There is a zero-defect mentality. Absolutely. They don't give people the means to try out new things to determine what works and what doesn't."	"...it's the older generation that again produces resistance to learning...We want to keep doing what we are good at." "…people in our generation...are more open and more accepting and use the technology and want that technology. But, the people that are older, right, are less progressive..." "The Navy likes stability. They like proven technology." "The biggest issue is almost two-fold. It's the old style, this is the way I have always done it, this is what I grew up doing, worked good enough for me, why do you think you are better than me mentality that a lot of people have." "I think our culture is inhibiting and I have felt that personally...I think we all have experienced elements of where	"So, I would say mainly it's probably a security issue that prevents them from wanting to use more technology on ships or whatnot." "I think before you fund a program, or you have a new start for a new program, what are the cyber implications that is going to have...what if it gets hacked? How do we keep it safe?"

Organizational Resistance					
Hierarchy	Budget	Implementation Support	Zero-Defect Mentality	Culture	Environmental Restrictions
"I just think it's the bureaucracy...a lot of things about appropriation and the money and bringing certain—it's very political ….it just kind of turns into this bidding war and the bidding war takes forever...LCS was something they dreamt up of in the late 90s...we just saw the first one in like 2011." "The way that particular group does their contracting...has a significant impact because they say that they don't have the means or the authorities to change it to match developments...but I would imagine I can say, your stuff sucks, fix it or I will go somewhere else."	periods...making due with what you have, sometimes the quality can suffer and you can kind of see that whenever you get new recruits onboard a ship." "We are functioning on a continuing resolution...We don't have funding for the new projects as long as we have a CR in place...there is definitely a huge political bureaucratic block that stops that advance." "Then they have to be willing to put in the dollars. It's easier to just leave something that is already in place, but I don't think it's working." "If it was stateside and it's just for training, I don't think they would support it [innovation] as much...but usually when you are downrange, you get to get more money, you get more support."		"There are so many ways that leadership hampers implementation and even consideration...after you get to a certain level in your career, it stops being about doing the mission and it starts being a lot more about what do I need to do to survive, because in today's zero-point failure mentality, you are not allowed to make a mistake. If you make a mistake, you are axed."	innovation has been inhibited justly or unfairly...But, I definitely have seen personally in my career where innovative efforts…are squashed...To try, and fail, and try again. If we could do that in the DoD, I think it would go a long way." "It [resistance] is probably from how...this generation of upper leadership grew up in the real navy where hazing was allowed...Does that mean in the future...our sections of upper leadership, will be different? Most likely." "There is a younger generation now who has like instant gratification...because everyone wants here and now. So, like as the older generation phases out, you are seeing more of the instant gratification in everything that we do." "...you won't get that [candid input] from senior leadership because there are political ramifications, there are professional ramifications…"	

C. INDIVIDUAL RESISTANCE

1. Technology Acceptance Model

a. Perceived Usefulness

Figures 18 and 19 displays the findings regarding officer perceptions of mobile learning technology with respect to its usefulness, including its worth, effect on learning and productivity, usefulness on learning and development, and effect on performances.

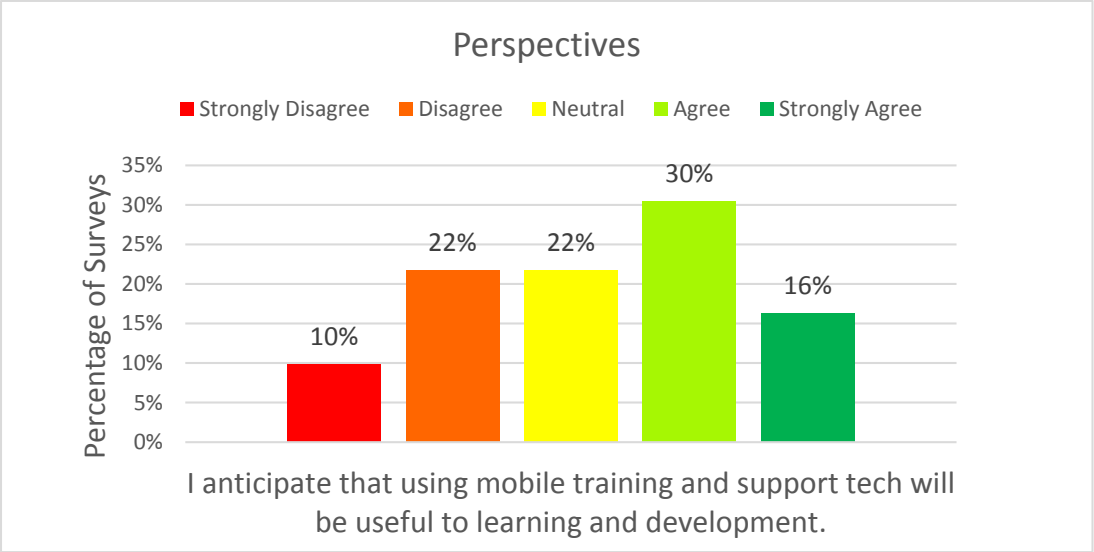

Figure 18. Officer Participants' Perception of the Usefulness of Learning Technology

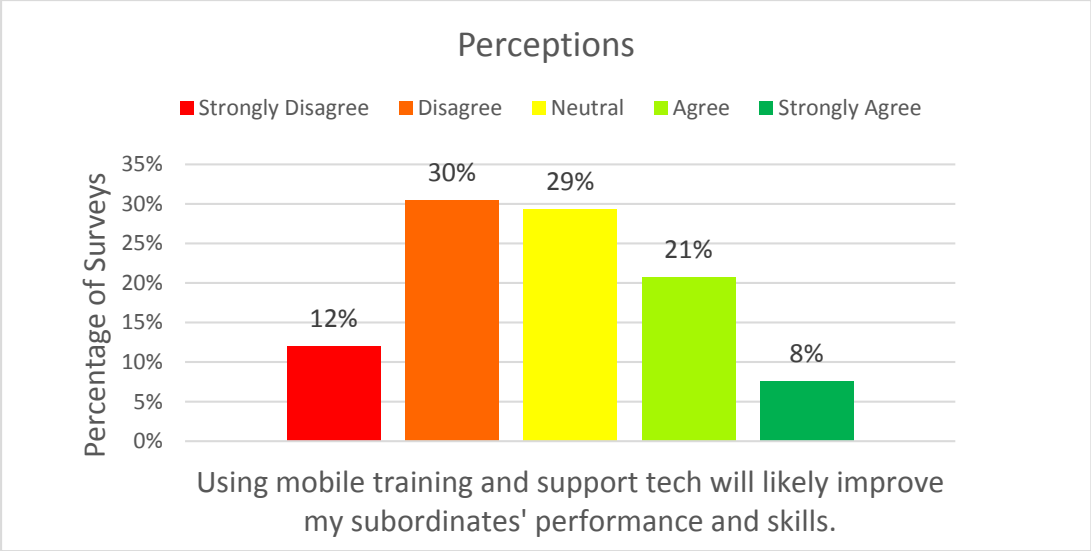

Figure 19. Officer Perception of Learning Technology's Impact on Performance

Figure 18 displays information regarding officer perceptions of mobile learning technology with respect to its usefulness in learning and development. Figure 18 indicates that 46% of officers believe that mobile training will be useful to the learning and development of their subordinates; however, a third of them do not believe that it will be useful. This sort of uniform distribution was also discovered for officer's perception of mobile learning technology's value, effect on learning and productivity, and effect on subordinate's performances. Nevertheless, Figure 19 reveals that 42% of officers do not believe that such technologies will improve their subordinates' performance, while only 29% believe it would have a positive impact on performance. These two graphs indicate that, while some officers see the value and usefulness of this learning technology, there is still a fair amount who do not see the value and an even stronger perception that, while useful for learning and development, the technology is not likely to improve subordinate's performance.

Enlisted survey participants do not have any notable perceptions regarding the usefulness of mobile learning technology. This could be attributed to the fact that the enlisted survey participants are those enlisted personnel who recently graduated basic

training and thus may not have as much exposure to mobile learning technology in the Navy. Their inexperience could contribute to the inconclusiveness of the data.

While the minority of the officer survey participants did not anticipate that mobile training and support technology would be useful, the majority of officer interviewees perceived it useless. This discrepancy could be due to a differing focus of the survey and interview questions. The surveys were geared more toward mobile learning technology and support, such as apps and tablets, whereas the interviews were geared more toward computer based training, such as NKO, and the inadequate development of simulators. The interviewees identified five main factors which hinder the usefulness of learning technologies in the Navy: redundancy, obsoleteness, value, mentality, and realism.

Six interview participants referred to the redundancy of training technology having a negative effect on perceived usefulness. NKO was one specific system which was frequently cited with respect to this issue. Interviewees expressed frustration with the unchanging nature of the training content. One interviewee proclaimed that "Every year it's the same thing." Another elaborated when they stated, "I think over time when you start doing it for years and years you kind of memorize everything anyways." Table 2 reveals that innovation is needed for training to be effective.

Another inhibiting factor discussed in the interviews was the obsoleteness of learning technologies in the Navy. Interviewees revealed that existing Navy technologies are "...so antiquated." They acknowledge that the Navy's bureaucracy attributes to this when they noted, "The new technologies—what we accept today as good technology, in two days, two months, two years will be obsolete." Another participant suggested, "If you want people to take something seriously, you have to do a little...changes...because then people aren't going to take it seriously..." Additionally, respondents believe that the Navy fails to match the needs of the people, in which the technology is supposed to benefit in the first place. This can be seen in Table 2. One interviewee articulated this, "They were shoving this technology down our throat, and making us fit the technology, versus the technology fitting us." Another interviewee also expressed, "It's out of date content...some of the technology that we have been using is out of date, so it's like slow to access."

Many interviewees stressed the importance of perceived value in the acceptance of learning technologies as supported by Table 2 when one individual stated "...as long as the technology is bringing value and people know what that value is, I think people...are more apt to adopt new things." However, we found in the interviews that officers are not convinced that Navy learning technologies provide this value. One seasoned respondent admitted this when they stated: "In the past, 12 or almost 13 years I have been in the Navy I can't say that any educational you know, benefit was given to me from online." Interviewees specifically attributed lack of interaction and poor content to their pessimism. There was dissatisfaction with the level of interaction in various Navy learning technologies. One member projected, "…I think they [NKO courses] are not useful because the lack of interaction" and another asserted, "We did not like it [CD ROM training] because the amount of interaction was severely hampered." Interviewees alluded to the fact that the training content in learning technologies tends to be generic, making it both redundant and frivolous. This is supported when one interviewee stated, "...CBTs overall are not very helpful because you just click through to get done…Yes, you did the training and you take a test, but overall it's not helpful."

Interviewees were disgruntled that by the "check-in-the-box" mentality that has become a staple in Navy culture. It was evident that this rationale interferes with the perceived usefulness of learning technologies as at least six officers mentioned it. One interviewee expressed how this mentality affects perceptions of training and learning technologies, "…what I have seen them do is more of a check-in-the-box kind of thing...There is no value added." We can see that perceptions trickle down. When leaders do a poor job of conveying the value of something, subordinates will not see a purpose of having or doing it. One respondent even divulged, "You are not doing it for me; you are doing it to cover your butt...if you don't care, then I don't care." Another interviewee snickered at the quality of training that the Navy provides, "What did you learn? You are checking the box. They are checking the box because they need to check their boxes...They are good; you are qualified...But, in the end, you don't know anything." They reveal that motives are misplaced on both ends; the personnel are purely concerned with getting the qualifications required to get promoted, while the command is merely trying to meet

numbers so they can report to big Navy that the training is complete. This was the statement, "...They are tracking completion." Table 2 further illustrates how the Navy's tendency to give a relatively low priority to training negatively influences participants' perception regarding the usefulness of learning technologies. One participant admitted, "I am only doing this [CBT] because I have to, not because I am actually going to learn something from it."

Realism plays a significant role in influencing one's perception of the usefulness of learning technology. Systems that are unrealistic depreciate the value of learning technology and thus cause individuals to dismiss both the training and system. The quotes displayed in Table 2 reveal participants' expectation that if they are going to invest their time into learning tools, such as simulators, they expect them to be superior to the real thing. One interviewee shared their impression of an unrealistic system, "...they also introduced something called a low-cost trainer...it was supposed to save money, but I thought it was more detractive because it wasn't really the real thing...it was just not implemented well." Realistic systems, on the other hand, can provide sailors with the invaluable training that they need to guide safe and smart decisions. Another individual shared their experience with an exceptionally well-designed trainer, "The ship simulators are very realistic. They give you like a very good perspective, and when you are in a ship simulator, you actually feel you are on the bridge of a ship so much that I actually got sick on one. They are very effective." Sometimes, inexperience may also shape perception. One interviewee expressed how, during training, they thought that the simulator was very useful, but realized otherwise throughout their actual fleet experience. This was revealed when they explained, "...once I got on my ship and I was speaking to the department heads, they were like the simulation, it's not accurate..."

Overall the interviews accentuated that perception of usefulness plays a vital role in the acceptance of learning technologies in the Navy. Unfortunately, the participants' responses suggest that their experiences with current Navy technologies have negatively influenced their expectations of the potential usefulness of new learning technologies. Characteristics such as redundancy, obsoleteness, value, and check-in-the-box mentalities

appear to have contributed to participants' resistance to the adoption and implementation of learning technologies.

b. Perceived Ease of Use

Figure 20 and 21 display data regarding the perceptions on ease of use of learning technologies from the officer perspective.

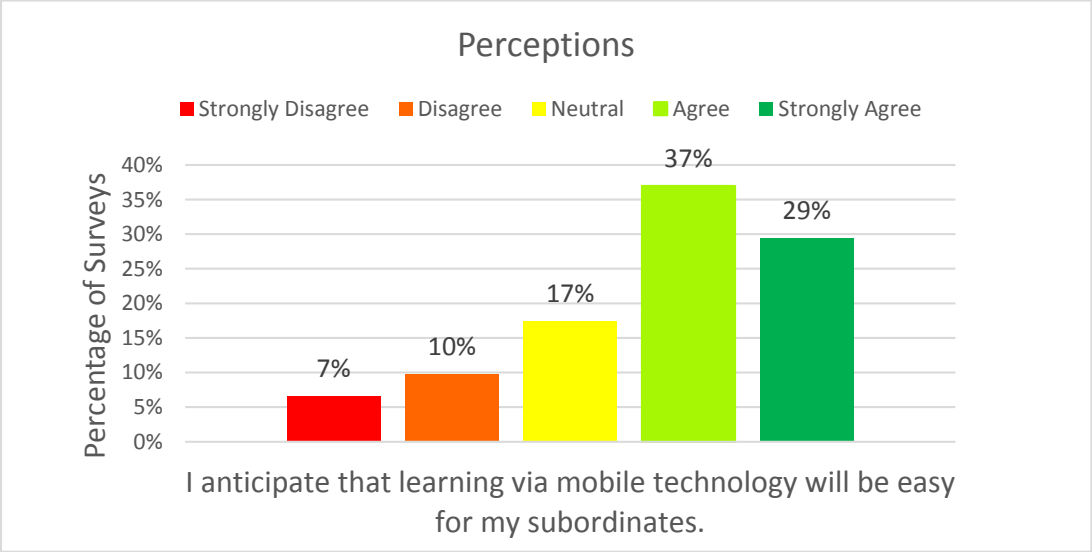

Figure 20. Officer Perception on the Ease of Use of Learning Technology

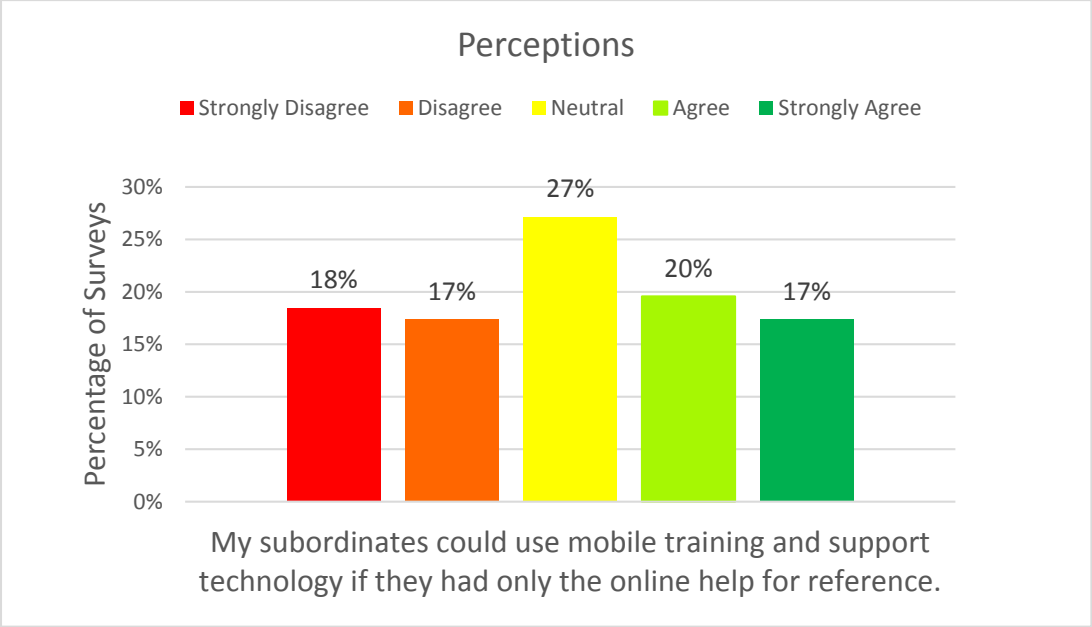

Figure 21. Officer Perception on Ease of Use with Only Online Aids

As seen in Figure 20, 66% of the officers either agree or strongly agree that technology will be easy to use, but only 37% agree that subordinates could use mobile training with only online help as a resource, as indicated in Figure 21. This indicates that they are not convinced that learning technology should be the sole means of training and learning; therefore, technology must supplement, rather than substitute the human component of training.

While the majority of survey participants perceived mobile learning technology and support as easy to use, the interviewees tended to focus on the challenges they faced with particular systems. Overall, the interviews revealed a belief that in order for a learning technology to be readily accepted it must be easy to use in terms of both operating and accessibility. Interviewees expressed that they expect a system to be relatively effortless so that it does not contribute to their workload and further detract from their primary jobs and responsibilities. As one interviewee put it, “Time is of the essence in the Navy…” and no one has the do not time, energy, or patience to waste trying to learn a system, diagnose an issue, or even wait for one of these limited resources to be both working and accessible. The interview data suggests that sailors will not be accepting of a new learning technology

if it creates distractions from their job. This driver of resistance was highlighted by one interviewee who stated, “If it’s not user friendly, you are going to get a lot of push back ...” and another expressed “I don’t see much push back [with apps and training technology] because it’s more...readily accessible, easier to do, which has helped.” The interview participants provided an array of reasons as to why a system may not be perceived as easy to operate, including, system errors, system complexity, and poor internet connection.

The interview data suggested that sailors are often discouraged from using a system when system errors prevent it from running smoothly. As explained by one participant and revealed in Table 2, “...if there is not a system that shows reliability and you don’t see that it’s a smooth system from the onset, I think that’s where you kind of lose people the most...” Another individual noted that a lot of technology glitches in the Navy stem from incompatible goals and resources, arguing that adding too many new capabilities to archaic systems inhibits ease of use. More specifically, their comment was, “...A lot of stuff we have in the navy is really old. So, anytime you are trying to upgrade it...Often, it puts in just as many bugs or things that make it really difficult to use. So, it’s really not as much of an enhancement if people can’t use it.” One participant’s comments were congruent with the TAM model, which was discussed earlier, and proposes that technology cannot be successful if it is not both easy to use and useful. The participant stated, “It [a shipboard simulator] was definitely a relief to have...we could get everybody back into the mindset and back to the level of knowledge needed...but it was a failure of a system...due to the hardware problems...wish we could have gotten more value out of it.” The participant’s comments suggest that, although the system was perceived to have value, its technical issues made it too difficult to serve its intended purpose.

The interviews revealed that Navy systems are perceived as very complicated. Participants’ comments suggested their perception that the reason for this is may be that the Navy tries to put too many capabilities into a single system. Interviewees suggested that this both makes things difficult to understand, as well as, difficult to navigate beyond the associated malfunctions. The Table illustrates this when one individual said, “...when they add more capability to existing technology, they make it more complex to use, instead of more user-friendly.” Another interviewee expounded upon this when he discussed ease

of use issues with a specific system with which he had experience, “SWALIS is a little complicated. If someone wants to pick it up and try to figure it out, it’s hard...there is online training that you go through prior to having your user account...I did the user training, but still, it was mostly because of the glitches...” Another interviewee compared Navy systems to the civilian sector, “We already see what’s out there on the world-wide-web...yet ours are so complicated, and they don’t work.” On another note, systems that are difficult to use can create an unnecessary burden on Sailors, thus inhibiting readiness. One interviewee explained, “There were a lot of things that were not intuitive, a lot of workarounds people had to learn...a lot of people would become frustrated rather than learn it and actually get proficient.”

Research indicated that poor internet connectivity is a major hindrance to ease of use of any technology in the Navy, especially regarding those technologies aboard ships. Numerous interviewees expressed their annoyance with system connectivity issues. Interviewees’ comments suggest that not only does poor connectivity discourage individuals, but it often thwarts their ability to complete their training. As reported by one interviewee, “Connectivity kicking you out...you can’t do this; you can’t do that.” Many interviewees reflected on their frustrating ship board experiences. NKO, again, dominated the subject’s examples. One member complained, “NKO courses can take almost an hour to load before it actually works when you are out at sea. That will hinder people’s ability and desire to complete training online.” Another individual blamed poor internet connectivity for training deficiencies, “...when I was deployed, it was really, really hard to get on to NKO and do our training...When you are deployed, it’s slow, like the internet doesn’t work...a lot of people would fall delinquent in.” As seen in Table 2 one interviewee summed the effect of the issue up stating, “There are constant network issues [aboard ships]. It just makes you hate the whole system. It makes you lose trust in the system.”

The interviews revealed that the limited availability of resources in the Navy challenges the perceptions of the ease of use of technology. One interviewee revealed how the operational environment is not readily equipped with learning technologies when they mentioned, “There’s only limited availability of computers [aboard ships].” Another officer alluded to budgetary constraints when he explained, “For us on the ship, we were

always trying to get the simulator time. The annoying thing about it was that...you would only have a certain amount of time allotted to you as a ship, which was frustrating..." The interviewee explained that simulator usage was regulated due to the expenses associated with supplying, operating, and monitoring the systems. This was implied by individuals in the aviation community as well.

Although the comments of a majority of interview participants suggested that they held a negative perception of the usability of Navy learning technologies, three individuals focused on the Navy's way forward. Despite existing challenges and inhibitions, these individuals recognized and praised the Navy's effort to correct some of the aforementioned issues. Two particular examples provided were the "MyNavyPortal" integration and low bandwidth format for the use of Navy websites aboard ships. One interviewee expressed their appreciation, "That navy portal is awesome because it's a one-stop shop...to become more user-friendly, for personnel to go on this." Another participant explained, "…it made it [NKO] very easy, like user-friendly, when they implemented that [low bandwidth format] as opposed to making people have to do all of these trainings, and then you have no internet or bandwidth to do it."

Table 2. Individual Resistance Interview Quotes

Individual Resistance	
PEOU	PU
"The challenge is going to come I think from people...not knowing how to use the technology and becoming frustrated with it." "...if there is not a system that shows reliability and you don't see that it's a smooth system from the onset, I think that's where you kind of lose people the most . . ." "...when they add more capability to existing technology, they make it more complex to use, instead of more user friendly." "There are constant network issues [aboard ships]. It just makes you hate the whole system. It makes you lose trust in the system." "...Because of the challenges with those platforms [NKO and TWMS], we spent so much time making sure that everyone checked the box, got their training done, and...if you multiply across how many people in the command, being able to log in or having to reset passwords and access...the technology, instead of being an enabler, became a hindrance."	"They were shoving this technology down our throat, and making us fit the technology, versus the technology fitting us." "...as long as the technology is bringing value and people know what that value is, I think people...are more apt to adopt new things." "It really doesn't work the best, but it works...people may be clicking through the slides or whatever, but it's getting done. Like there is a check off...sometimes the navy feels like there is more...bigger fish to fry ...gets put in the back burner." "It ties into its legitimacy. As a student/user, if you are presenting me a new tool that you want me to use, it better be better than the real life experience, because anything less than that, it's just not worth my time and my effort…" "The ship simulators are very realistic. They give you like a very good perspective, and when you are in a ship simulator, you actually feel you are on the bridge of a ship so much that I actually got sick on one. They are very effective."

2. Status Quo Bias Theory

a. Inertia

Figures 22 through 27, shown below, show the percentage of responses indicating agreement or disagreement to questions geared at determining whether individuals exhibit inertial behaviors and attitudes toward change. Table 3 summarizes the impactful quotes from our interviews, which help further illustrate the findings of status quo bias.

(1) Affective-Based Inertia

Figure 22 indicates that, while a little over a third of officer participants disagree or strongly disagree that they prefer subordinates continue to use traditional classroom because they are comfortable doing so, slightly over a third display affective-based inertia by agreeing. On the other hand, Figure 23 indicates that 57% of enlisted participants either agreed or strongly agreed that they prefer traditional classroom instruction because they are more comfortable doing so, thus strongly indicating affective-based inertia.

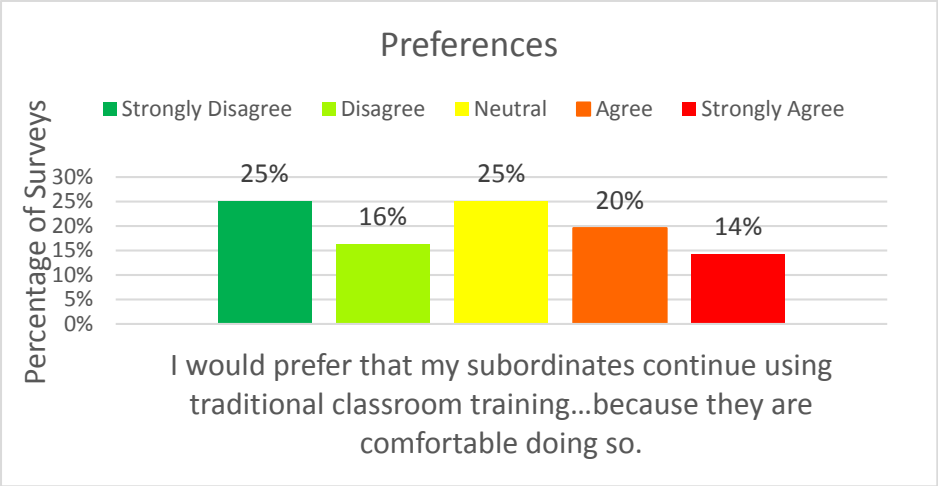

Figure 22. Officer Affective-Based Inertia

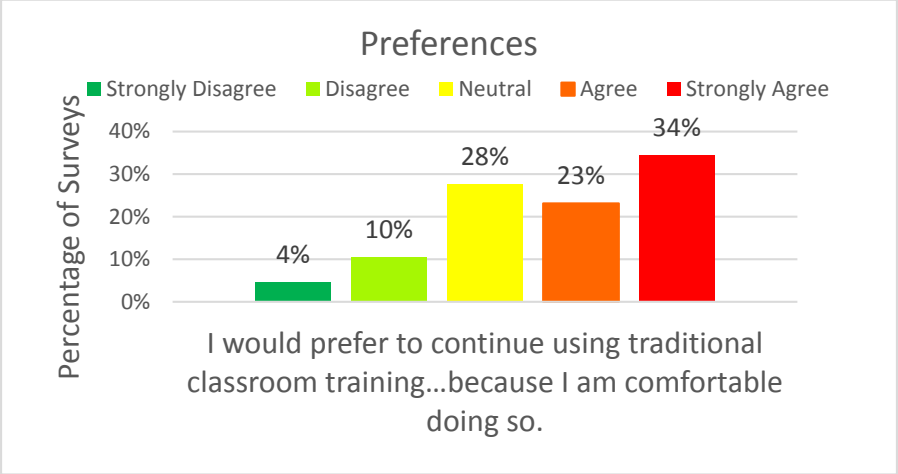

Figure 23. Enlisted Participant Affective-Based Inertia

Further supporting the results of the survey, the comments of multiple interview subjects suggested that there is affective-based inertia, in that, individuals fear shifting away from systems or processes that are familiar. This was evident when one interviewee stated, "...it's the fear of the unknown, and I don't know what I am doing kind of thing." while another mentioned, "They [older generation] are not technologically savvy." As demonstrated in Table 3, interview data suggest that civilian government workers and senior military personnel tend toward status quo behavior because of comfort in existing systems and complacency. One interview subject explained, "…some civilians and people who have been in the navy for a long time are stuck in their ways of ...what they are already doing ...already comfortable with...they don't want to try anything new because they don't have to." Another interviewee's comments elaborated on this perspective, "...to have five different case studies [mishaps] in one year, maybe complacency is a factor. Maybe we thought ourselves invincible, and at the end of the day it was just ticking time bomb…"

(2) Behavior-Based Inertia

Figure 24 indicates that 79% of officers either disagree or strongly disagree that they prefer subordinates continue to use traditional classroom because it is the way they have always done it. Therefore, the vast majority of officers did not display behavior-based inertia. While the officers did not demonstrate behavior-based inertia, Figure 25 indicates that 43% of the enlisted participants either agreed or strongly agreed that they prefer to continue using traditional classroom instruction because it is the way they have always done it, indicating behavior-based inertia. Only 23% disagreed with this preference.

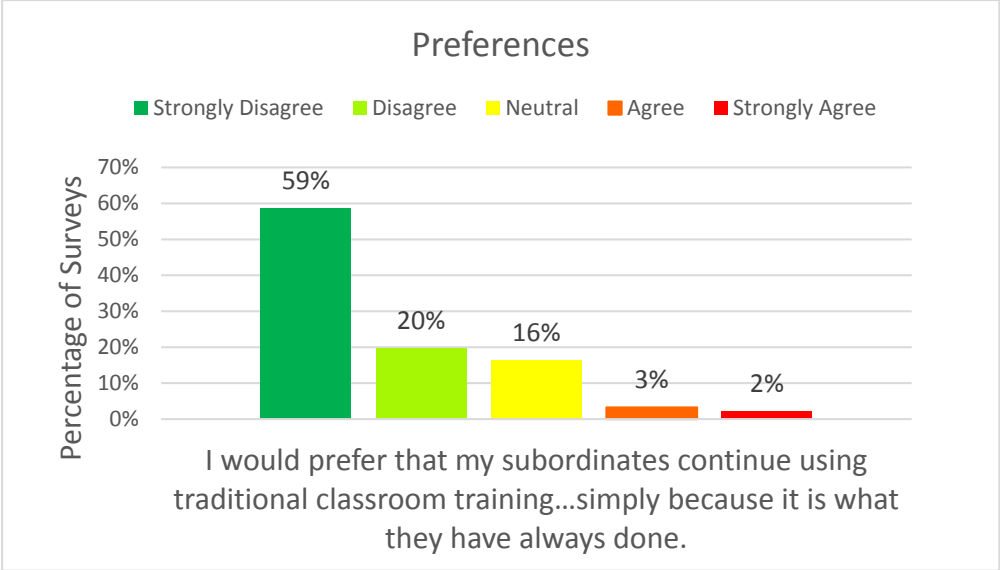

Figure 24. Officer Behavior-Based Inertia

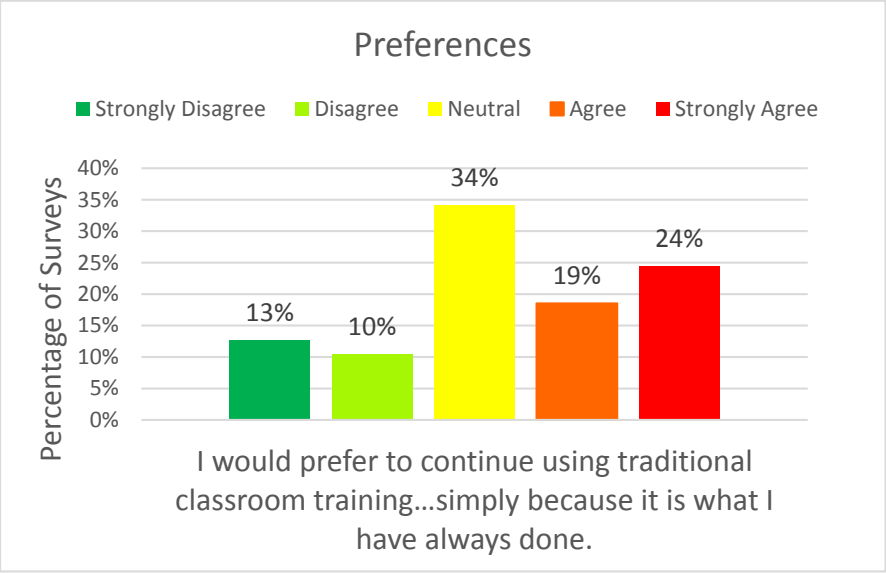

Figure 25. Enlisted Participant Behavior-Based Inertia

While the officer survey data did not demonstrate behavior-based inertia, the officer interviews highlighted participants' perception that the higher echelons of the Navy and experienced personnel exhibit this form of inertia. For example, one interview subject stated, "...change is not always accepted right off the bat...in our organization, we know that it takes time and a lot of people are resistant because they are used to things being a

certain way…This is not how we do business...” Further illustrating this belief, another interviewee described, “People who are higher up in the organization came up in a certain way ...this is how we trained; this is how we did it...definitely going to be some resistance on an organizational level.”

(3) Cognitive-Based Inertia

Figure 26 indicates that officers do not show cognitive-based inertia, in that a significant portion of them responded disagree and strongly disagree to whether they prefer that their subordinates continue to use traditional classroom even though they think it is not the best way of doing things.

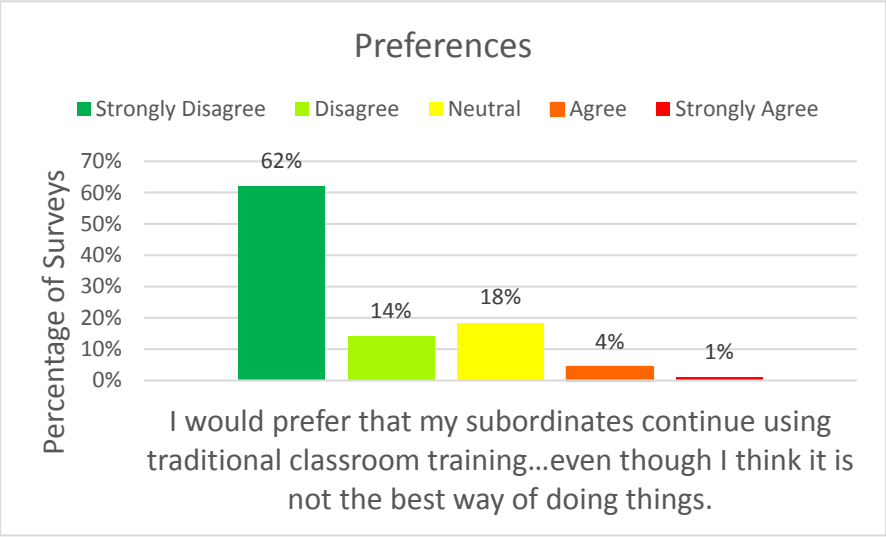

Figure 26. Officer Cognitive-based Inertia

While the data does not directly suggest cognitive-based inertia, the findings described in the organizational acceptance section are indicative of this type of inertia, in that the bureaucratic confinement, insufficient budget, zero-defect mentality, and environmental constraints restrict the organization from actively pursuing the best way of doing things. It would seem that rather than deliberately choosing to remain in a status quo, there are organizational constraints that force it. The respondent that had an experience suggesting this type of inertia described an instance where an innovative technology was

greatly needed, and they designed the best possible system under the given constraints. This interviewee reflected, “No one thought it was possible…we were pretty much backed up to a wall and had to come up with an idea real quick, so that’s what we did...There was a lot of resistance even up to the point where we had this system working...” It appears as though, even though an innovative solution was presented, individuals still presented with resistant behaviors.

Figure 27 shows that officer participants exhibit a fairly uniform distribution with a majority of responses disagreeing with not changing their mind easily; however, almost a third of respondents agreed that they do not change their mind easily. A similar tendency was demonstrated in responses to the survey question about tensing up with change. This indicates that the data is split in terms of officer participants exhibiting signs of inertia. Similar results occurred in the enlisted participant results.

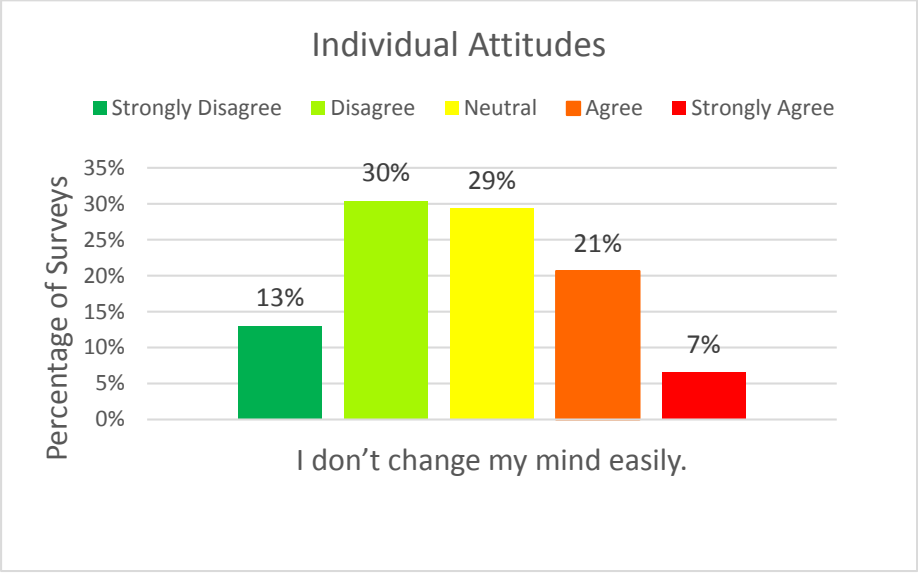

Figure 27. Officer Inertial Attitudes toward Change

b. Habit

Figures 28, shows the percentage of responses indicating agreement or disagreement to questions geared at determining whether individuals exhibit habitual behaviors.

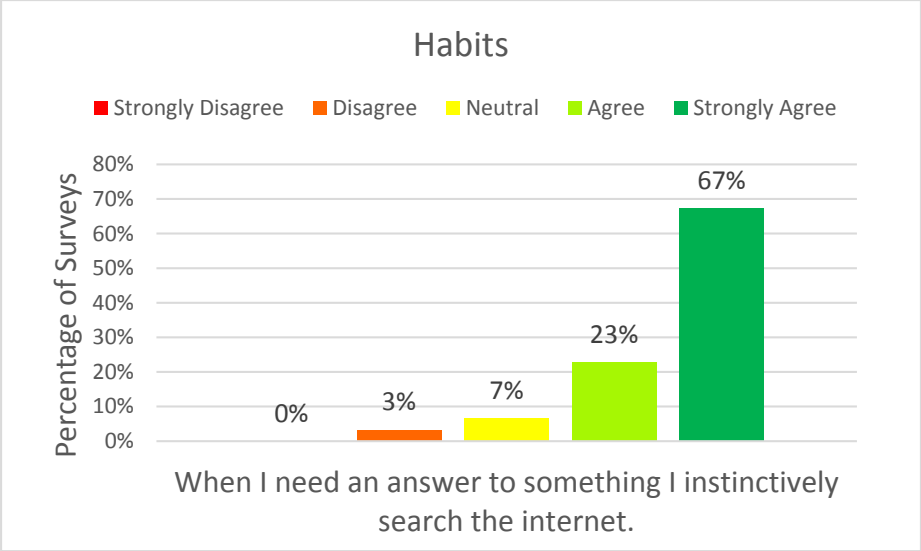

Figure 28. Officer Habitual Behaviors toward Technology

Figure 28 indicates 90% of officer participants at least agree with the vast majority strongly agree that they instinctively search the internet for information. Similar results were discovered when participants were asked if they unconsciously use text or email to communicate. Enlisted participant data yielded the same type of results. Overall, both officer and enlisted participants demonstrate habitual behaviors with the use of technology to search for information and communicate. This habitual use of technology could be indicative of a propensity of individuals to attach to habitual behaviors and remain in a status quo state.

We previously discussed how our findings revealed that Navy personnel exhibit status quo bias via affective-based inertia, in that people prefer things that they are comfortable doing. As shown in Table 3, the interviews also suggest that some officers are concerned that habit could contribute to affective-based inertia since habitual use can create a comfort and familiarity dependency. As one interviewee explained, “I guess it is built into their daily muscle memory...Because they are comfortable in that state, they don’t want to try anything new ...”

c. Rational Decision-Making

Figures 29 shows the percentage of responses indicating agreement or disagreement to questions geared at determining whether individuals exhibit behaviors indicative of rational decision-making status quo bias.

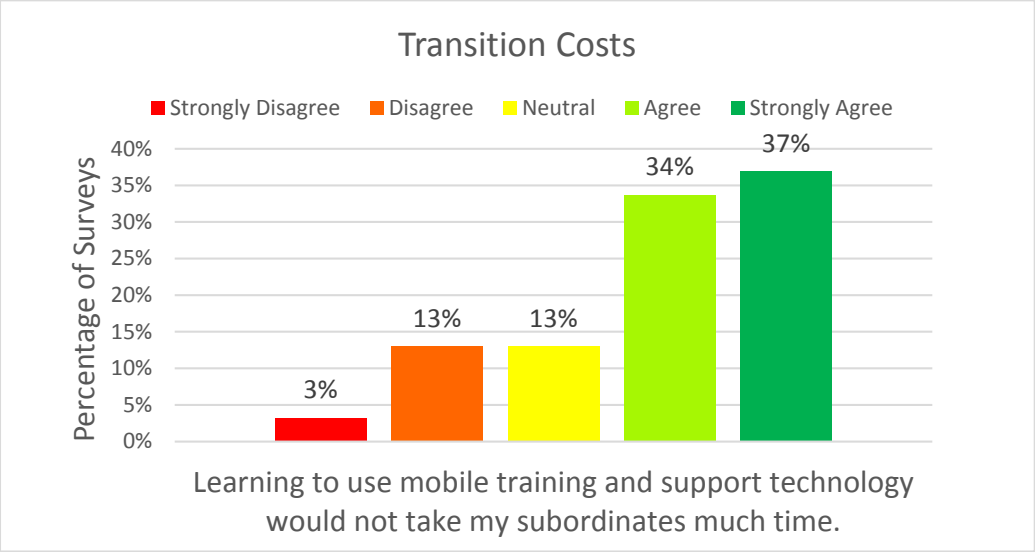

Figure 29. Officer Perception of Transition Costs (Familiarization)

As Figure 29 indicates, the majority of officer participants perceived that the time transition cost of learning to use new technology would be small. Additionally, other questions indicate that the majority of officer participants perceived that it would be easy for them to transition their skills toward the new technology and do not believe that it would take a lot of time and effort to transition to using it. Therefore, when weighing the cost and benefits rationally, they should not be expected to want to remain with the status quo.

While the survey findings did not indicate a high perception of time and effort transition costs of implementing technology, some interview responses revealed some instances of resistance influenced by the transition cost of learning new technology. For instance, one respondent stated, "...I am resistant to any change...more so, with the change in technology, because now I have got to take time away from doing something I need to

do, to learn this new technology" while another mentioned, "People are going to be more resistant if it's difficult to learn."

d. Psychological Commitment

Figures 30 shows the percentage of responses indicating agreement or disagreement to questions geared at determining whether individuals exhibit perspectives indicative of a psychological commitment to sunk costs or because of regret aversion.

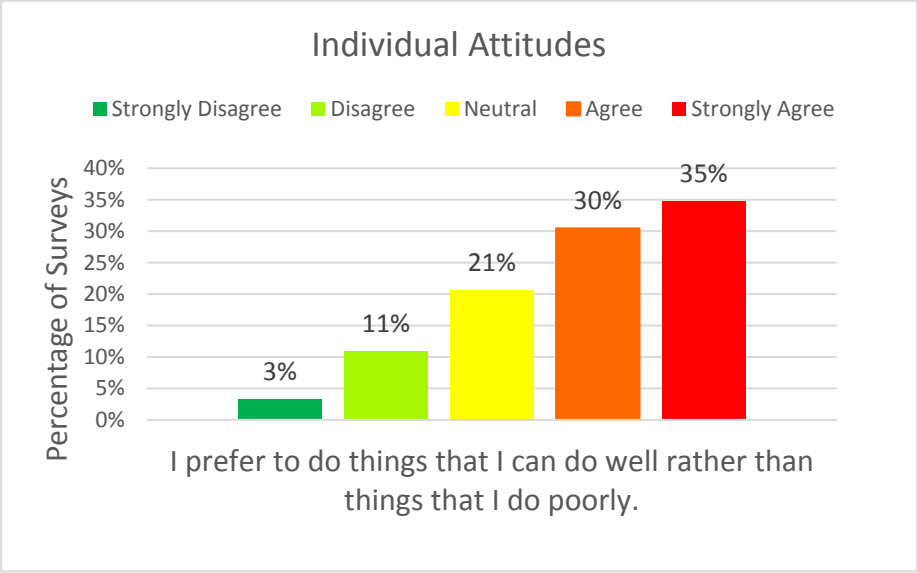

Figure 30. Officer Regret Aversion

Figure 30 indicates that the majority of officers preferred doing things that they do well, rather than doing things they do poorly. Additionally, other questions indicated this same attitude for the majority of officer participants, for example, enjoy doing tasks where they will not make errors and doing their best and care how others perceive how well they are doing. Similar attitudes were discovered with the enlisted participant responses. These responses have a relatively strong indication of psychological commitment to the things they do well, to avoid regret aversion caused by fear of making mistakes.

Further supporting the survey results, officer interview data suggested that there is status quo bias via the mechanism of psychological commitment due to regret aversion. Specifically, respondents cited preserving their image and career, as well as, playing it safe as reasons for resistance toward seeking innovative solutions and technologies. For instance, one interview respondent explained, I think the hesitancy to do it is, A, longevity, B, not wanting to be the guy that sucked, and then C, why rock the boat if it already works?" Furthermore, another interview subject reflected, "...When I worked in Millington...Anything you wanted to do [people would say] it's going to be another [DIMARS]...it was supposed to be this great solution that would solve a lot of problems, a lot of resources, money, and people were put toward it. The story was it failed." This quote suggests that individuals could have potentially wanted to try new things but were dissuaded by the fear of repeating failure. This could also be linked to the resistance caused by the perceived zero-defect mentality, previously discussed in the findings, as this mindset would also be a form of regret aversion.

D. BENEFITS AND COSTS OF LEARNING TECHNOLOGIES

1. Expected Benefits

Figure 31 through 33 demonstrate information about officer and enlisted perspectives on the benefits of mobile training on individual's productivity, efficiency, learning ability, and learning effectiveness.

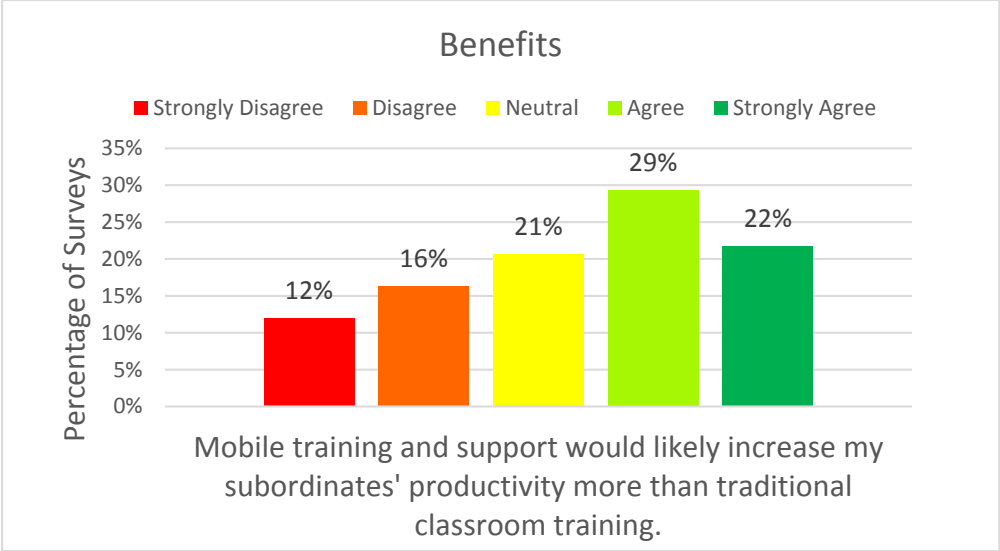

Figure 31. Officer Perspective on Benefits of Mobile Training on Productivity

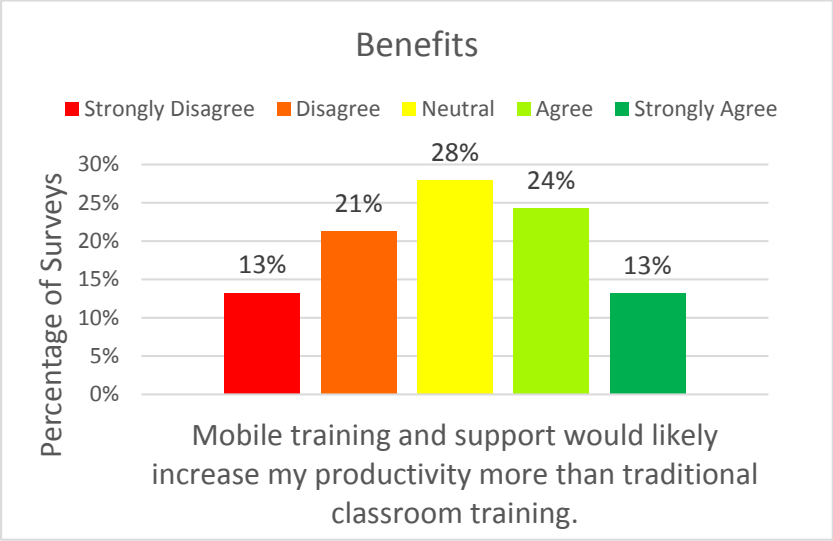

Figure 32. Enlisted Perspective on Benefits of Mobile Training on Productivity

Figure 31 indicates that 51% of officer survey participants believe that mobile training will produce more productive Sailors, as compared to traditional classroom training. Similar results were observed in other questions, with regards to subordinate's ability to accomplish tasks quicker. Overall, according to Figure 32, enlisted participants

were a quite a bit less sure about whether their productivity would increase, with their responses being relatively evenly split between agree and disagree.

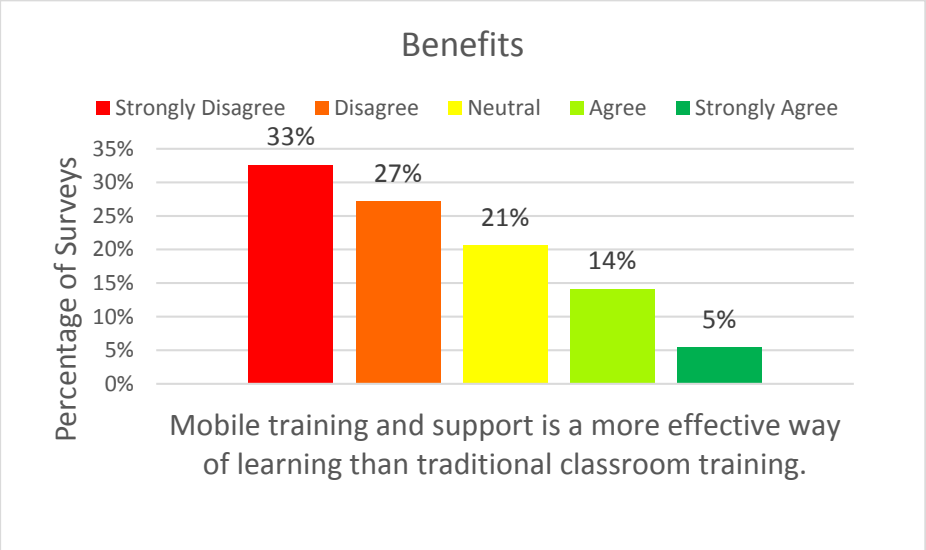

Figure 33. Officer Perspectives on Mobile Training Effectiveness

Figure 33 indicates that 60% of officer participants do not believe that mobile training is a more effective way of learning than traditional classroom training. Additionally, other questions yielded results that indicate that officers do not believe that mobile training will increase Sailor's learning or be more beneficial than traditional classroom learning. Enlisted respondents yielded very similar feedback as the officers.

Overall, this figure uncovers two general trends. The first trend is that overall officers believe that mobile training and support will be more beneficial for productivity and speed. However, the second trend shows that neither enlistees nor officers are convinced that it will be better in terms of effectiveness as a means of learning and training.

Similar to the survey results, officer interviewees believed that there are organizational and individual benefits to be gained from learning technologies, such as a time and cost-effective way to sharpen skills and knowledge. For example, one interviewee suggested, "Advantages were time, resources, individuals could hone their skills without necessarily having to have like the entire crew or doing an entire evolution…it [simulator]

gives people a lot more individual opportunity to sharpen their skills, and we can do it 24 hours a day."

Furthermore, interview responses suggested perceived potential improvements to the quality of life, personalization of learning and job preparation. Interviewees revealed that learning technologies "...make life a lot easier to complete the training..." In terms of quality of life, interviewees appreciate the capability of technology to allow them to use their time economically. One subject mentioned, "You allow the sailor or individual to do it at their own time ...it's not regimented like you need to come to this and do it..." In terms of learning customization, officers acknowledged that there are various learning styles and that technologies that are on the market today allow versatility to accommodate many learning styles. One interview subject reflected on one such technology already employed by the Navy, stating, "...the advantage of [cove] is that...you kind of get personal one on one time when it comes to learning. If that's the way you learn, like me, you learn better in that environment and [cove] is definitely a better learning tool than just a team simulator." Another interviewee further describes the importance of such learning customization, "I think there is a good amount of people that may be geared toward interactive learning."

Interviewees were particularly satisfied with the training that they received from the simulators, in both aviation and surface warfare community. Simulators were viewed as the "next best thing" to the "real deal." One interviewee elaborated, "But, it [the simulator] is the most cost effective way to have the experience without having the experience." The realism of the simulations contributed to their effectiveness, and many interviewees viewed them as an excellent way get exposure to unfamiliar systems. One subject mentioned how their training in the simulator made them more comfortable aboard the ship, "...I had never been on the ship...but we had simulators for driving the actual ship which helped me a lot with training because when I got on the ship, I was like okay, I know...that from the simulation." Another interviewee explained how the simulator made them more proficient in the aircraft, "The use of [flight] simulators...was very useful for practicing different scenarios for emergency procedures, limits...in preparation for flights." Interviewees also discussed how the simulators allowed you to experiment and familiarize yourself with the systems without the environmental hazards associated with the being on

a ship or in an airplane. One interviewee stated, “There is low risk, and it gives you the opportunity for repetition, it gives you the opportunity to learn what works and what does not…”

2. Expected Costs

Figure 34 indicates that, while 41% of officer respondents disagree that transitioning to mobile training would make subordinates less effective at their job, almost a third actual agreed that their subordinates would be less effective. This indicates that there could be a fair amount of resistance against mobile technology due to its perceived negative effects. The enlisted survey responses echo officer sentiments. Other questions revealed results similar to those in Figure 34, for instance, while the majority of officer and enlisted respondents disagree that work quality will suffer, there is still nearly a third of respondents who actually agree.

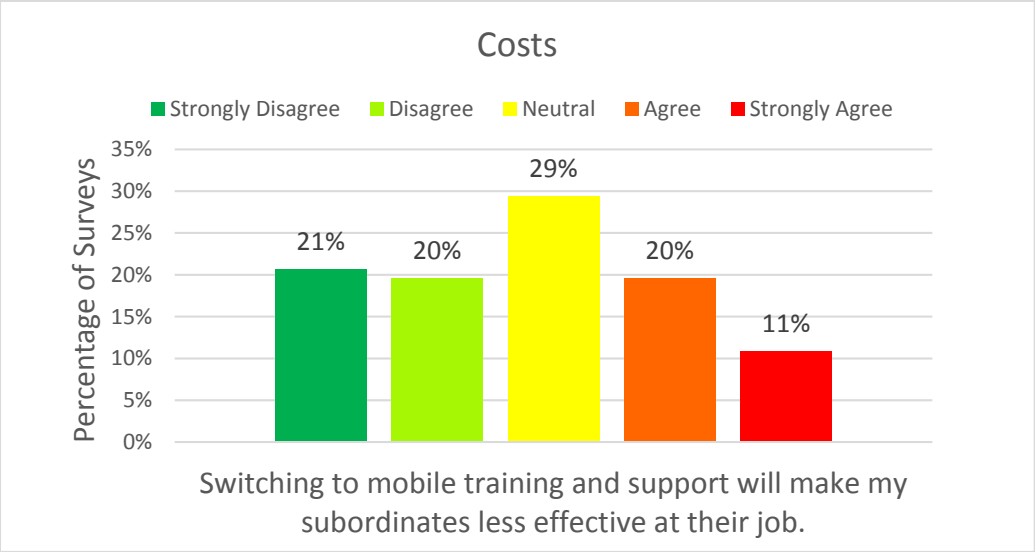

Figure 34. Officer Perceived Effects on Job Effectiveness

Interestingly, Figure 35 below indicates that the majority of officer participants agreed that learning would be less effective with mobile training, although in previous questions the majority indicated they saw the value in the transition to using mobile learning technology.

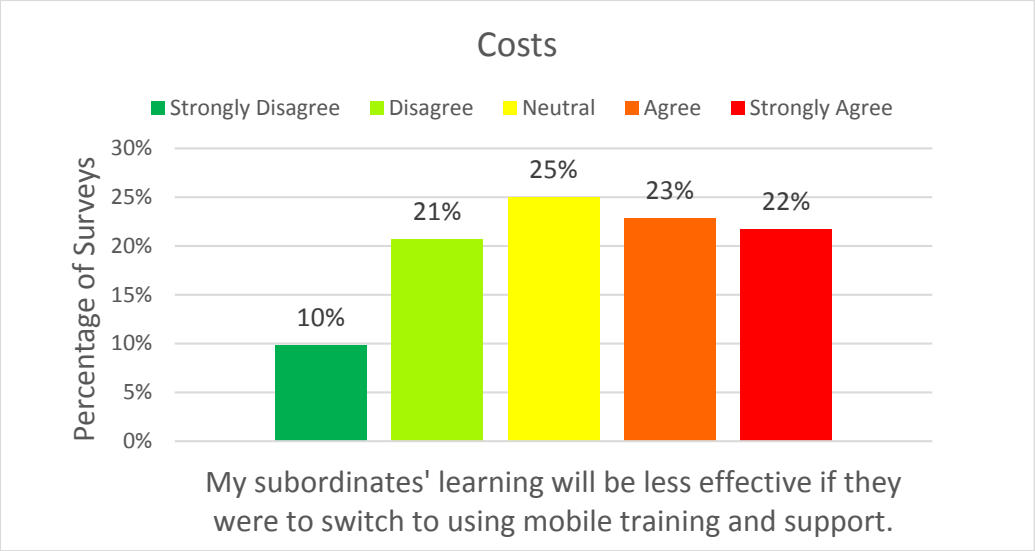

Figure 35. Officer Participant Perceived Costs

Table 3. Status Quo Bias Interview Quotes

Status Quo Bias			
Inertia	Habit	Rational Decision Making	Psychological Commitment
Affective-Based Inertia "…always reacting...Windows is not supporting Windows 7 and Windows XP and those things anymore, every command now is going to Windows 10...But, if that wasn't the case, we would still be using Windows 7, we would still be using Windows XP...the Navy always is one step behind." "...it's the fear of the unknown and I don't know what I am doing kind of thing." "...some civilians and people who have been in the N Navy for a long time are stuck in their ways of...what they are already doing...already comfortable with...they don't want to try anything new because they don't have to." **Behavior-Based Inertia** "Then you had the old school back in my day...Those who are uninformed and who are closed minded about what technology can do for us, those are a problem in their own right." "…change is not always accepted right off the bat… ...in our organization, we know that it takes time and a lot of people	"I want to say there is a kind of command presence against using the technology just because of over-reliance of it." "I guess it is built into their daily muscle memory...Because they are comfortable in that state, they don't want to try anything new..."	"...I am resistant to any change...more so, with the change in technology, because now I have got to take time away from doing something I need to do, to learn this new technology." "People are going to be more resistant if it's difficult to learn."	"The people who are worried about covering their you know what's...The safe play is to use the existing technology versus to invest in what's coming next." "...When I worked in Millington...Anything you wanted to do [people would say] it's going to be another [DIMARS]...it was supposed to be this great solution that would solve a lot of problems, a lot of resources, money and people were put toward it. The story was it failed." "I think the hesitancy to do it, A, longevity, B, not wanting to be the guy that sucked, and then C, why rock the boat if it already works?"

Status Quo Bias			
Inertia	Habit	Rational Decision Making	Psychological Commitment
are resistant because they are used to things being a certain way…...This is not how we do business…" "It was very much this is our standard, don't look into it too much, just do it." "People who are higher up in the organization came up in a certain way…...this is how we trained, this is how we did it." **Cognitive-Based Inertia** "No one thought it was possible we were pretty much backed up to a wall, and had to come up with an idea real quick, so that's what we did…...There was a lot of resistance…...even up to the point where we had this system working…" "...to have five different case studies [mishaps] in one year, maybe complacency is a factor. Maybe we thought ourselves invincible, and at the end of the day it was just ticking time bomb."			

E. SUMMARY

This data provided in this chapter supports the conclusion that the Navy's processes and culture likely have a strong influence over the adoption and use of new learning technologies. It identifies organizational and individual barriers the Navy must address to mitigate resistance to new learning technologies. Overall, the data reveals the perception of the value of new learning technologies but also uncovers key causes of resistance and several barriers to the successful adoption of learning technologies including the following: limited implementation support, generational cultural differences, zero-defect mentality, bureaucratic regulations, budgetary constraints, environmental restrictions, limited perceived usefulness, limited perceived ease of use, inertial behaviors and attitudes, habitual behaviors, perceived transition costs, and regret aversion. The final chapter provides an overview of the results found in this chapter, as well as, recommendations to mitigate technology resistance and recommendations for future research.

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V. RECOMMENDATIONS AND CONCLUSION

A. INTRODUCTION

This study investigates how Navy processes and culture are likely to influence the adoption and use of new learning technologies, as well as, what organizational and individual barriers must be addressed to overcome resistance to new learning technologies. First, we summarize the overall results of our analysis. Next, we present recommendations derived from the literature and participant suggestions. Finally, we make recommendations for future research.

B. SUMMARY

First, this section summarizes the overall results of the survey and interview analysis. Overall, we found that key cultural factors and Navy processes are perceived to have negative impacts on technology acceptance and stifling effects on innovation, including the perception that there is a divide between the attitudes of younger/junior and older/senior service members, with the former having more accepting attitudes toward new technologies. Generally speaking, participants in this study perceive technology to be a cost-effective and efficient way to train but show concern that it has its drawbacks in terms of effectiveness and usefulness of training, especially if live instruction is replaced with technologies. Our research revealed a strong perception among participants that the Navy implements technologies without fully considering the end-user's ease of use and perceptions of usefulness, which causes unnecessary burden and leads to resistance.

Our research indicates that younger generations and thus the Sailor of the future needs instant gratification. Self-reports, as well as perceptions of others, show that younger generations are very dependent on mobile technology in their day to day lives, and have a relative openness to experimenting with and using new technologies. These findings suggest that mobile learning technology is likely to be an accepted and valuable training option. Importantly, our research also indicated potential, major obstacles and barriers to the successful implementation of learning technologies, which included:

1. Perceived lack of implementation support
2. Generational cultural differences
3. Zero-defect mentality (Regret Aversion)
4. Bureaucratic regulation
5. Budgetary constraints
6. Environmental restrictions
7. Limited perceived usefulness
8. Limited perceived ease of use
9. Inertial behaviors and attitudes
10. Habitual behaviors
11. Perceived transition costs

First, our findings reveal that junior ranks are unsure as to whether their leadership will provide them with the necessary resources and training to effectively implement and use new technologies. For instance, around a quarter of reports attributed likely resistance to the transition cost of learning new technology. There was a feeling of uncertainty among roughly a third of enlisted participants, with regard to immediate supervisor and big Navy's support for technology adoption. As discussed in the previous chapter, junior officers were apprehensive about learning technologies because they believe that senior ranks or older generations are resistant to such technologies as a result of them being rigid in their ways, less technologically savvy, and not fostering an innovative environment. One cultural factor contributing to the perceived lack of encouragement for innovation is the impression that there is a zero-defect mentality. The interview data shows that younger sailors believe that a zero-defect mentality is creating aversion to risk-taking, challenging the norm, and being innovative. Individuals who are immersed in a zero-defect culture fear that mistakes may result in negative reputation effects and career implications and may thus be reluctant

to take the risks required for using new technologies. Additionally, our survey findings show that sailors have a relatively strong psychological commitment to existing processes and the things individuals they do well and seek to avoid regret aversion caused by fear of failure.

There are also non-cultural factors relating to the Navy's hierarchical structure and bureaucratic processes that will likely influence the adoption and implementation of learning technologies. The Navy is a hierarchical government organization with inherent bureaucracy and red tape. More than a third of interview respondents indicated their perception that the bureaucracy and cumbersome contracting processes, built into the Navy's hierarchy, inhibit innovation and effective and efficient technology adoption. The literature review further supports this idea and shows that predictability, routine, regulations, and bureaucracy in hierarchical organizational cultures tend to lead to resistance to change. Our findings also indicate that this hierarchical structure establishes a discontinuity of perceptions of current technology effectiveness between decision-makers at the top of the hierarchy, who are far-removed from the deckplate, and the perceptions of personnel at the lower levels of the hierarchy. If personnel on at the top of the hierarchy perceive that current technologies are more effective than they actually are, the search for better, innovative technologies may be inhibited.

Our study identified some barriers to technology adoption that are systematic and potentially unavoidable. For example, our findings reveal the perception, among more than half of participants, that budgetary depression in the current, fiscally constrained environment has detrimental effects on technology research, development, and ultimate implementation. This contributed to the belief that the Navy is forced to sacrifice training quality until it is forced into a reactionary state. The final organizational factor that may be unique to the Navy is the environmental restrictions that come into play when personnel are deployed on ships. Our findings reveal that the integration of new technologies has implications and potential security vulnerabilities in the cyber domain that may be a rationale for resistance.

Our research revealed that there is a strong consensus, among Navy officers, that learning technologies will not enhance the effectiveness of learning and development and

are unlikely to enhance performance and skills. They conveyed their perception that the Navy has done a poor job developing and delivering both training and the accompanying technologies so that it is tailored to the end-user's needs. Navy officer participants perceived training as redundant and as using antiquated and unrealistic systems, which are viewed as ineffective and inefficient. Additionally, officer participants perceived that a "check-in-the-box" mentality has further inhibited intended purpose of current leaning technologies.

Although the more than half of officers anticipate learning technologies will be easy for younger generations to use, existing Navy technologies have contributed to more mature sailors' perceptions that learning technologies are not easy to use. Participants perceived that the nature of the complex tasks and environment the Navy faces, results in Navy systems that tend to be complex and error-prone. Participants proposed that the Navy tries to put too many capabilities in one system, which then not only becomes confusing to users but also leads to performance issues. Further exacerbating this, participants argued that the Navy's operational environment and network infrastructure is not likely to support new technologies because Navy systems are infamous for their poor connectivity. Our interviews revealed that such issues make for a difficult user experience. Due to this, officers expressed concern that the younger generations would not be able to learn and operate Navy systems with purely online assistance. Finally, with respect to perceived ease of use, participants perceived that the Navy's limited resources make it difficult for users to access learning technologies, especially at those times when it fits into their busy schedules.

Our findings reveal some inertia, in terms of preferences for traditional classroom instruction out of comfort and familiarity. This inertia could be caused by the negative perceptions of the usefulness and ease of use of new technologies, discussed in the sections above. Additionally, our findings suggest that civilian government workers and military personnel exhibit behavior-based inertia and cognitive-based inertia, in that they tend toward the status quo because of habitual behaviors, dependency, and complacency.

Our research revealed that officers anticipate that learning technologies will improve the efficiency of the training process, yet fail to provide the same quality of content

that face-to-face training offers. Conversely, participants' responses suggest that learning technologies are a cost-effective way to potentially improve quality of life and training, as well as, increase job preparation.

C. LEARNING TECHNOLOGY RECOMMENDATIONS

Next, we present recommendations for mitigating resistance to technology adoption derived from the literature and research participant suggestions. While, the literature review and the interview and survey responses express the value of new learning technologies, our research highlights resistant behaviors and several barriers to the successful adoption of learning technologies including the following: limited implementation support, generational cultural differences, zero-defect mentality, bureaucratic regulations, budgetary constraints, environmental restrictions, limited perceived usefulness, limited perceived ease of use, inertial behaviors and attitudes, habitual behaviors, perceived transition costs, and regret aversion. As discussed in the literature review, it is not enough to acquire a new and innovative learning technology and say go forth and use it. Research indicates that performance improvements or gains in learning effectiveness from the use of emerging learning technologies are not a guarantee, merely an opportunity (Caporarello, Magni, & Pennarola, 2016). If strong resistance or even apprehension exists, it can completely derail successful adoption and effective use, as well as, diminish expected benefits (Caporarello, Magni, & Pennarola, 2016). Interview participants were extremely forthcoming with insightful suggestions to mitigate friction against technology adoption and implementation. Existing research also provides recommendations for transitioning hierarchical organizations toward a more innovative institution. These recommendations are summarized in Table 4 and discussed in detail in the subsequent text.

Table 4. Brief Summary of Technology Implementation Recommendations

Perceived Barrier	**Potential/Suggested Solution**
Lack of implementation support **and** Perceived transition costs of learning new technology	➢ Provide thorough and effective training on any new technology. ➢ Conduct collaborative training on new systems.
Generational cultural differences	➢ Increase communication up and down all ranks to include solicitation of the end-user's perspectives, feedback, and experiences when considering future technology investments.
Zero-defect mentality/Regret Aversion	➢ Publicly praise out-of-the-box thinking and continuous learning, as well as experimental research, even if it failed (Cameron & Quinn, 2006). ➢ Incorporate task forces from lower ranks of the organization to brainstorm new solutions (Cameron & Quinn, 2006). ➢ Develop reward and incentive schemes to encourage innovation (Cameron & Quinn, 2006). ➢ Conduct critical-thinking training across the entire organization (Cameron & Quinn, 2006).
Limited perceived usefulness	➢ Communicate importance and benefits of transitioning to a new system to all levels of the organization. ➢ "Sell" the new product to the end-users with proof of concept, via testing and data. ➢ Technology should augment, not replace, live instruction.
Limited perceived ease of use	➢ Diversified feedback loops via pilot tests or focus groups to ensure designs are user-friendly. ➢ Verify at the end-user level that technological designs meet intended purposes.
Inertial behaviors and attitudes **and** Habitual behaviors	➢ Create buy-in via end-user integration in the development process. ➢ Top-down communication of new vision and values, and validate that this permeates to the lowest levels (Cameron & Quinn, 2006).

As alluded to earlier, the particularly high operational tempo of the Navy requires individuals to be selective with where they allocate their time and resources. With that being said, individuals are reluctant to shift their time and attention from their operational responsibilities to learn a new learning technology, especially if they do not see the value in it. Our research revealed, a strong perception among participants that the Navy throws new systems at its members without explaining the importance, which in turn creates considerable apprehension and resistance. One interviewee described this well, "I think a

lot of times the Navy says okay, here is a new policy and go do it…I think it's important to educate people at different levels in the chain of command. To say, here is the technology. Here is kind of the goal…Communicate to all levels at the chain of command what they are trying to do." Conveying the significance of a new system is imperative to technology acceptance and implementation. This is illustrated by the statement, "I think if they see the value in it, and that can be communicated...why this is a good system and how this will benefit the sailors, then I think it can and will get accepted at an organizational level." Another subject provided further support, "Once again, is it important?...make sure you are clear so that the users know the importance of it."

Research suggests that the hassle and frustration associated with learning a new technology can cause individuals to hastily dismiss a system before ever seeing its benefits. To mitigate this resistance, the Navy should ensure that they provide adequate training on any new technology to remove as much burden as possible from the individual, and as well, make certain that any new systems can serve its intended purpose. One interviewee expressed how there is more resistance when personnel are expected to learn something on their own, "I think there is resistance when a new technology comes along, and there is no formal training for it…if we say here is this new thing, let's all go to class and learn about it...somebody should be proficient with it, to convey all of the nuances of using it." One particular suggestion for training, which came up on multiple occasions, was to offer collaborative training on new systems, in order to develop an adequate understanding of new technological systems, enhanced by knowledge sharing.

One major theme across several recommendations for mitigating resistance was to solicit and incorporate the end-user's perspectives, feedback, and experiences when considering future technology investments. Really driving home this point, one respondent stated, "I would change how the higher-ups are thinking that certain things are affecting deck plate people." This could help assuage the concerns of unsatisfactory ease of use, insufficient usefulness, and the disconnect between the top and bottom of the hierarchy, expressed in the surveys and interviews. One interviewee explained, "There is a horrible breakdown of communication that needs to be resolved…It stems from leadership's not understanding what the warfighter is dealing with" and "Those E5/E6 who have that great

depth and breadth of knowledge, must be involved in the communication process." Some interview respondents further suggested that getting feedback from all levels of the organization stimulates innovation and creativity, ultimately resulting in more adequately developed products. This was evident in the statement, "I think feedback is always the way to go because a lot of times the Navy has a way of designing things and just throwing it out there, and they don't get the proper feedback from all the way down to the bottom, and then they realize that they made a mistake, or they don't utilize the people's creativity." This vital feedback can be solicited via broad pilot tests or focus groups, which include service members of all ranks.

Our analysis indicates that if feedback about new technologies is not solicited during technology development, the end product may face increased resistance. Put simply by an interview subject, "…when it comes to technology, it needs to be built alongside people that actually do the job…an outsider…doesn't understand the details. When they build that technology and the end-user gets it, [they think] oh this is crap…when it's been built alongside the people that actually are the end-user, and they have their inputs, it's a better program." Additionally, by integrating the opinions and feedback of the end-users at all levels into the development process, interview subjects believe this could help create the necessary buy-in for the use of technology, thus mitigating resistance.

Other recommendations involved creating an environment that encourages innovation, for instance, "Let go of the reins, accept failure, accept that failure is going to happen." This is congruent with breaking down the perceived zero-defect mentality in the Navy, to be open to the suggestions of individuals at all levels and allow flexibility to try new things. Additionally, the literature review revealed potential actions to foster an innovative environment in hierarchical organizations. The literature suggests creating task forces at lower levels of the organization to develop new ideas; creating systems to reward innovative behaviors across the entire organization; conduct training at all levels to demonstrate the importance and potential applications of creative thinking; have the highest levels of leadership confer with mid-level managers to ensure the new direction and values have filtered down effectively; and break away from zero-defect mentalities by praise and publicize experimentation and learning (Cameron & Quinn, 2006).

Moreover, in terms of creating buy-in, some interview participants noted the need to sell the technological product to the end-users to further strengthen acceptance. One interview subject went as far as to say, “You definitely have to have the data...that says this works. The statistics showed this and this. You are not just going to get it to happen by word of mouth.” This suggests that demonstrating through a test or concept proof that new technology has value can create the buy-in needed for successful adoption.

While the literature and data analysis identify potential benefits that emerging learning technologies may afford the Navy, interview subjects revealed some compelling recommendations about the role that technology should play in the learning environment. Overall, officers and enlisted participants urged that technology not serve as a complete substitute for traditional classroom learning but rather augment already existing instructional methods. They emphasized the need for the human component, whether it be in the form of a subject matter expert available for assistance or instructors to facilitate learning. For example, interviewees explained previous flaws they had experienced. “There is no one guiding you there.” “...you have to have a way to be able to ask questions.” “The computer is not programmed to be able to answer that question. However, someone who is actually experienced, an instructor who is fully qualified is going to say oh, I see where you are going.” “I think the technology allows it to be a secondary source like to face to face training, like a good back up reference.”

Additionally, the point was made that the Navy needs to be careful when deciding when to insert learning technologies. Specifically, one individual mentioned, “I think that some things require face to face. Some things require technology. It needs to be a little bit of both.” Another interviewee responded with, “I think there will always remain types of training and education that technology can’t replace the value of that in person time…” On the contrary, some individuals were actually opposed to technology even as a supplement, one of which stated, “…then make it as hands-on as possible instead of all of these computer things.” This was not, however, the majority of recommendations.

Lastly, several interview subjects recommended incorporating more utilization of phone applications due to their convenience, ease of use, accessibility, and flexibility. For example, one officer mentioned, “Even having an app you could literally do it from

anywhere...It's very convenient for anyone to be able to access it and through the use of technology, it's made it very easy." Another stated, "I would definitely go with the app. I think that more people—even older people—are using their phones more, and I think the app is pretty easy, simple, and you can do it from your phone, your iPad...it's definitely more convenient." One respondent even explained that some apps today have collaboration features that can facilitate knowledge sharing.

D. CONCLUSION

In an effort to achieve high-velocity learning, it is important for the Navy to employ all available resources, including modern and innovative technologies. However, once the determination is made to adopt certain emerging technologies, the successful implementation of said technologies hinges on the Navy's understanding and mitigation of organizational and individual barriers technology adoption. This study set out to identify the Navy's organizational and individual barriers to and enablers of the adoption and use of new learning technologies, as well as, organizational and individual benefits afforded by such technology. Our study answers the following primary research questions: (1) How are Navy processes likely to influence the adoption and use of new learning technologies? (2) What unique organizational and individual barriers the Navy must address to mitigate friction between new learning technologies and Navy processes, structure and culture? The following secondary research question is addressed: What behaviors and job performance and learning outcomes are enabled by new learning technologies?

To gather pertinent quantitative data, we conducted surveys with NPS Navy students and military faculty. We enhanced the quantitative data with qualitative data from in-person interviews and a thorough literature review. The literature served as a theoretical baseline of existing organizational and individual resistance frameworks, to build upon with the surveys and interview data. Surveys and interviews allow us to analyze perspectives of naval leaders, training agents, learners, and other stakeholders on new technologies and potential implementation barriers. The results and recommendations, summarized above are intended to support the Navy's future intentions to incorporate new learning technologies, with an emphasis on mitigating resistance and overcoming barriers

to technology adoption. Next, we discuss the limitations of our study and make recommendations for future research, to improve upon research in this subject area.

E. LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Finally, we make recommendations for future research. This study revealed some important insights into the barriers to the adoption of learning technologies and potential recommendations to mitigate this resistance. However, it is not without its limitations include the fact that we were unable to include interviews of enlisted personnel, we were unable to get a representation of all communities. Additionally, there was not a large representation of Navy leadership in our dataset. Therefore, there is a need for larger scale study to conduct a more statistically rigorous study, to provide elaboration on perceptions across all communities and ranks.

Ideally, we would prefer to be able to conduct a larger number of interviews and surveys across a wider variety of communities, ranks, and all levels of leadership, so that our quantitative analysis might yield more statistically significant results. Furthermore, collection of demographic information on gender may have yielded insightful results or biases across genders that this study is unable to address. Additionally, making the enlisted survey voluntary may help reduce the potential for lackadaisical responses which can skew the data, for example, we noticed that there were survey responses that individuals merely answered neutral throughout the entire survey or portions of the survey. It is important to note that making the surveys voluntary may potentially introduce self-selection bias, whereby individuals who have a vested interest in the problem or potential policy outcome select into participation and others do not. This can bias the data in the direction of the attitudes of these individuals. Although it is unclear as to what direction the bias might go in, additional bias could be introduced by the fact that the surveys and interviews were only conducted on officers who are NPS students, who are currently removed from the fleet and in a different environmental and institutional setting. Should these considerations be taken forward, we believe that the Navy could get even more of the valuable suggestions and opinions expressed in this study.

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APPENDIX A. ENLISTED SURVEY QUESTIONNAIRE

For each of the questions below, please refer to the following:

The Navy might be able to use mobile learning technology for follow-on training courses and support resources. As opposed to traditional face-to-face classroom training and education classes, mobile learning technology would entail utilizing your smartphone and/or tablets (e.g., iphone, ipad, Android, etc.) to access training courses, modules, and additional resource materials. This would enable you to undergo training remotely while either on- or off-duty, instead of travelling to training sites and physical schoolhouse.

BENEFITS

Mobile training and support would likely increase my productivity more than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support would likely enable me to accomplish relevant tasks more quickly than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support would likely increase my learning more than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support is a more effective way of learning than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support would generally be more beneficial to me than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

COSTS

Switching to mobile training and support will make me less effective at my job.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The quality of my work will suffer if I were to switch to using mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

It would take a lot of time and effort for me to switch to the new way of learning/training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

My learning will be less effective if I were to switch to using mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Learning to use mobile training and support technology would not take much time.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Becoming skillful at using mobile training and support tech would be easy for me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Perceptions

Changing to mobile training and support seems worthwhile.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I oppose the change to the new way of delivering training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Using mobile training and support tech will probably increase my learning and productivity.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I anticipate that using mobile training and support tech will be useful to my learning and development.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Using mobile training and support tech will likely improve my performance and skills.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Using mobile training and support tech should enhance my effectiveness.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I anticipate that learning via mobile technology will is easy for me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I could use mobile training and support technology if I had only the online help for reference.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Experience

Please indicate how much experience you have using mobile ***learning*** technology.

None *Very little* *Some* *Quite a bit* *A whole lot*

How often do you use email on your phone to communicate?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

How often do you use text apps to communicate?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

How often do you use your smartphone to search the internet?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

How often do you use your smartphone to seek information in some way?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

How often do you use your smartphone to find demonstrations or training (on apps like youtube)?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

On average, how many times a day do you use your smartphone for any purpose?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

Expectations

I anticipate that my immediate supervisors will provide the necessary help and resources to enable me to effectively use mobile training and support technology.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I anticipate I will be given the necessary support and assistance by my superiors to effectively use mobile training and support technology.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I believe my immediate supervisors will be supportive of the change to mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I believe that the Navy supports a change to mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Habits

Whenever I need an answer to something I instinctively search the internet.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Whenever I need to communicate with someone, I unconsciously start using text or email.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Preferences

I would like to use mobile training and support in the future

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I would prefer to continue using traditional classroom training…

…because I am comfortable doing so.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

…simply because it is what I have always done.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

…even though I think it is not the best way of doing things.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Individual Differences

I don't change my mind easily.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

When I am informed of a change of plans, I tense up a bit.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I like to do the same old things rather than try new and different ones.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I sometimes find myself avoiding changes that I know will be good for me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I like to experiment with new information technologies.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I prefer to do things that I can do well rather than things that I do poorly.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I'm happiest at work when I perform tasks on which I know that I won't make any errors.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The opportunity to do challenging work is important to me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

When I fail to complete a difficult task, I plan to try harder the next time I work on it.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I prefer to work on tasks that force me to learn new things.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The things I enjoy the most are the things I do the best.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The opinions others have about how well I can do certain things are important to me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The opportunity to learn new things is important to me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I have often accomplished things that got me “psyched” to work even harder.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I obeyed rules and regulations that were established by my parents.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Growing up, I often acted in ways that my parents thought were objectionable.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Do you often do well at different things that you try?

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Not being careful enough has gotten me into trouble at times.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I feel like I have made progress toward being successful in my life.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Age in years _____

Rank_____

Occupational Community (e.g., Supply Corp, Aviation Maintenance, etc.)

_____

Married or living with partner?	Yes	No
Do you have any children under the age of 18?	Yes	No

Please describe some of the **primary benefits** you think switching to mobile training and support will have on your learning, work, and/or life.

Please describe some of the **primary costs** you think switching to mobile training and support will cause to your learning, work, and/or life.

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APPENDIX B. OFFICER SURVEY QUESTIONNAIRE

For each of the questions below, please refer to the following:

The Navy might be able to use mobile learning technology for follow-on training courses and support resources. As opposed to traditional face-to-face classroom training and education classes, mobile learning technology would entail utilizing your smartphone and/or tablets (e.g., iphone, ipad, Andriod, etc.) to access training courses, modules, and additional resource materials. This would enable you to undergo training remotely while either on- or off-duty, instead of travelling to training sites and physical schoolhouse locations.

BENEFITS

Mobile training and support would likely increase my subordinates' productivity more than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support would likely enable my subordinates to accomplish relevant tasks more quickly than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support would likely increase my subordinates' learning more than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support is a more effective way of learning than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Mobile training and support would generally be more beneficial than traditional classroom training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

COSTS

Switching to mobile training and support will make my subordinates less effective at their job.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The quality of my work will suffer if my subordinates were to switch to using mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

It would take a lot of time and effort for my subordinates to switch to the new way of learning/training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

My subordinates' learning will be less effective if they were to switch to using mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Learning to use mobile training and support technology would not take my subordinates much time.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Learning to use mobile training and support technology would not take my subordinates much time.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Perceptions

Changing to mobile training and support seems worthwhile.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I oppose the change to the new way of delivering training.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Using mobile training and support tech will probably increase my learning and productivity.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I anticipate that using mobile training and support tech will be useful to learning and development.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Using mobile training and support tech will likely improve my subordinates' performance and skills.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Using mobile training and support tech should enhance my subordinates' effectiveness.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I anticipate that learning via mobile technology will be easy for my subordinates.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

My subordinates could use mobile training and support technology if they had only the online help for reference.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Experience

Please indicate how much experience you have using mobile ***learning*** technology.

None *Very little* *Some* *Quite a bit* *A whole lot*

How often do you use email on your phone to communicate?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

How often do you use text apps to communicate?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

How often do you use your smartphone to search the internet?

Never *Less than once a week* *A few times per week* *A few times per day* *Many times a day*

How often do you use your smartphone to seek information in some way?

Never Less than once a week A few times per week A few times per day Many times a day

How often do you use your smartphone to find demonstrations or training (on apps like youtube)?

Never Less than once a week A few times per week A few times per day Many times a day

On average, how many times a day do you use your smartphone for any purpose?

Never Less than once a week A few times per week A few times per day Many times a day

Expectations

I would provide the necessary help and resources to enable my subordinates to effectively use mobile training and support technology.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I anticipate giving the necessary support and assistance to help my subordinates to effectively use mobile training and support technology.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I am supportive of the change to mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I believe that the Navy supports a change to mobile training and support.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Habits

Whenever I need an answer to something I instinctively search the internet.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Whenever I need to communicate with someone, I unconsciously start using text or email.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Preferences

I would like my subordinates to use mobile training and support in the future.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I would prefer that my subordinates continue using traditional classroom training…

… because they are comfortable doing so.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

…simply because it is what they have always done.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

…even though I think it is not the best way of doing things.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Individual Differences

I don't change my mind easily.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

When I am informed of a change of plans, I tense up a bit.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I like to do the same old things rather than try new and different ones.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I sometimes find myself avoiding changes that I know will be good for me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I like to experiment with new information technologies.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I prefer to do things that I can do well rather than things that I do poorly.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I'm happiest at work when I perform tasks on which I know that I won't make any errors.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The opportunity to do challenging work is important to me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

When I fail to complete a difficult task, I plan to try harder the next time I work on it.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I prefer to work on tasks that force me to learn new things.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The things I enjoy the most are the things I do the best.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The opinions others have about how well I can do certain things are important to me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

The opportunity to learn new things is important to me.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I have often accomplished things that got me "psyched" to work even harder.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I obeyed rules and regulations that were established by my parents.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Growing up, I often acted in ways that my parents thought were objectionable.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Do you often do well at different things that you try?

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Not being careful enough has gotten me into trouble at times.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

I feel like I have made progress toward being successful in my life.

Strongly Disagree **1** **2** **3** **4** **5** *Strongly Agree*

Age in years _____

Rank_____

Occupational Community (e.g., Supply Corp, Aviation Maintenance, etc.)

_____

Married or living with partner? Yes No

Do you have any children under the age of 18? Yes No

Please describe some of the **primary benefits** you think switching to mobile training and support will have on your learning, work, and/or life.

Please describe some of the **primary costs** you think switching to mobile training and support will cause to your learning, work, and/or life.

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APPENDIX C. INTERVIEW QUESTIONS

We will ask you to describe and discuss one more and one less successful learning technology adoption attempt.

Begin with the more successful adoption/implementation effort. Please tell us the story of what happened.

Probes/follow up questions:

- How did Navy policies impact the adoption/implementation effort?
- How did Navy processes impact the adoption/implementation effort?
- How did Navy culture impact the adoption/implementation effort?
- How did characteristics of the technology impact the adoption/implementation effort?
- How did the physical environment impact the adoption/implementation effort?
- What critical incidents, events or individuals influenced the process and/or end outcome?

Now please think of the less successful adoption/implementation effort. Please tell us the story of what happened.

Probes/follow up questions:

- How did Navy policies impact the adoption/implementation effort?
- How did Navy processes impact the adoption/implementation effort?
- How did Navy culture impact the adoption/implementation effort?
- How did characteristics of the technology impact the adoption/implementation effort?
- How did the physical environment impact the adoption/implementation effort?
- What critical incidents, events or individuals influenced the process and/or end outcome?

If you could wave a magic wand, what would you do to improve the adoption/ implementation of learning technologies in the Navy?

What is the role of learning technology in achieving ready, relevant and/or high-velocity learning?

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APPENDIX D. COMPREHENSIVE QUOTE LIST

ORGANIZATIONAL RESISTANCE

- **Culture**
  - "The Navy likes stability. They like proven technology."
  - "I think our culture is inhibiting and I have felt that personally...I think we all have experienced elements of where innovation has been inhibited justly or unfairly...But, I definitely have seen personally in my career where innovative efforts—not just my own, but others, are squashed...To try, and fail, and try again. If we could do that in the DoD, I think it would go a long way."
  - "The DoD in general will just keep working and chipping at something until either they pull the money from us completely, or somebody runs aground on a ship and...however many sailors die. So, I think that is probably a cultural mentality and attitude that we have."
  - "...whatever technology there is out there right now, virtual reality or whatever, just implement that. Upgrade the technology. Don't be so old school...Upgrade it."
  - **Older Generation**
    - "I would say, it's the older generation that again produces resistance to learning. If I have been using one system for the majority of my career, which could be over ten years, I am not going to want to change, especially without a change agent like formal training...We want to keep doing what we are good at."
    - "So, at the highest level, I think that's where you are going to get the most resistance because people in our generation, right—a generation—whatever—are more open and more accepting and use the technology and want that technology. But, the people that are older, right, are less progressive, in my opinion and when they get out of the military, then there won't be as much resistance. That's what I think because they are so stuck in their ways."
    - **"**The biggest issue is almost two-fold. It's the old style, this is the way I have always done it, this is what I grew up doing, worked good enough for me, why do you think you are better than me mentality that a lot of people have."
    - **"**I had commanders and chiefs who would love going out to sea, just to go out to sea and do stuff…. but we can't send ships out to sea all the time. There were was a lot of resistance."
    - **"**I think that with the...older leadership...especially if they are old school, technology can become kind of a challenge...they are more resistant to use it"
    - **"**It [resistance] is probably from how...this generation of upper leadership grew up in the real Navy where hazing was

allowed...Does that mean in the future...our sections of upper leadership, will be different? Most likely."

        - **"...**you won't get that [candid input] from senior leadership because there are political ramifications, there are professional ramifications, there is always going to be a cloud."
    - **Newer Generation**
        - "Today, you have you know, the people who are more in power and influential, are people who are our age. Who are much more accepting of technology. they are not scared of technology, and they are willing to—they are more willing to listen to it."
        - "There are more younger sailors, more apt to using technology and understanding of the benefit it has in their lives and how it can be utilized for training."
        - "There is a younger generation now who has like instant gratification...because everyone wants here and now. So, like as the older generation phases out, you are seeing more of the instant gratification in everything that we do."

- **Zero-Defect Mentality**
    - "I think we have a zero-defect mentality in general, with anything we do. We will try something and if it doesn't work, we will scrub it."
    - **"**They spent billions on the research and development, the installation, and it's now gone. It's a shell of its former self and nobody pays any attention to it. Instead of tweaking it and saying how can we still make it interactive, it just didn't work, so they said no. That gets done a lot...Because you have to justify the use of money. There is always going to be someone to say well it didn't work, why do we want to spend more money on that. It's hard for leaders to say I am trying to fix it. give me more money, give me more time, especially in this—the way this government operates. It's hard to get extra money to do stuff."
    - **"**There is a zero-defect mentality. Absolutely. They don't give people the means to try out new things to determine what works and what doesn't."
    - "There are so many ways that leadership hampers implementation and even consideration...after you get to a certain level in your career, it stops being about doing the mission and it starts being a lot more about what do I need to do to survive, because in today's zero-point failure mentality, you are not allowed to make a mistake. If you make a mistake, you are axed."

- **Budget Constraints**
    - "We have found in our current state, that we are lagging when it comes to the technological revolution."
    - **"**I think the Navy is aware of you know, the value of formal training and everyone's aware of what would be the optimal situation, but of course we have a lot of constraints with time and money."
    - "We see our budget shrinking, but yet we are still expected to work at the same level or above, because we have been programmed to be afraid to

say no...we are expected to remain at the same level of readiness until something catastrophic happens like what happened in the PACFLEET area."

- "I think there is a cultural organizational resistance once we realize we give up seats...we lose money."
- **"**SWOS used to be a six-month school before you would report to your ship. So, it was a cost saving measure [switching to SWOS-In-A-Box]. Yes, I am sure it saved thousands and thousands of dollars, but the end result was you had people who weren't trained to the level necessary that you would want them to, given that the responsibility of the job that they were going to go and do. So, I thought it had a detrimental impact, the Navy policy did, on the training of surface warfare officers**."**
- "**…**when you get into these economic decline periods...making due with what you have, sometimes the quality can suffer and you can kind of see that whenever you get new recruits onboard a ship."
- "We are functioning on a continuing resolution…...We don't have funding for the new projects as long as we have a CR in place...there is definitely a huge political bureaucratic block that stops that advance."
- "Then they have to be willing to put in the dollars. It's easier to just leave something that is already in place, but I don't think it's working."
- "I think money; I think they are cheap. I think they don't want to change it...you can't really keep putting budget caps on the amount of money you are going to spend on training, on training a sailor how to respond in an emergency."
- "If it was stateside and it's just for training, I don't think they would support it [innovation] as much...but usually when you are downrange, you get to get more money, you get more support."

➢ **Implementation Support**

- "...the people who were administering the technology didn't know how to use it...That's manpower funding and training problems with that one."
- "The training, however, was probably an hour, hour and a half long. But, for this to be a major system...you kind of need multiple days, maybe even multiple weeks to really kind of get the advanced aspects down."
- "...because of its hardware/software failures, it didn't offer...any benefit toward our fast cruise process...we don't have any ITs trained to use it yet, so it kind of just slowed down the whole process when everybody was trying to figure out how to get past those errors..."
- "...you definitely had to have a qualified civilian sitting at the console all the time**...**running the machine..."

➢ **Bureaucracy**

- "The bureaucracy is a definite hurdle."
- "...the organization is a colossus. It takes an enormous amount of time to do anything and it takes us an enormous amount of resources to do anything. It's so delayed due to the size of the bureaucracy to get going...The implementation scheme is so antiquated and useless,

effectively, that by the time a contract gets cut, something gets developed and put into place, its five years out of date."

- "...when the Navy says the cutting edge of technology, that's like for me, I just hear 10 to15-year process."
- "...even if they [the older generations] leave, their protégés are going to be there. The systems that they set up are going to be there, and the bureaucracy exists to sustain itself."
- "...There is a lot of bureaucracy...there are a lot of levels that you will have to go through to get something like that approved, but the willingness of sailors to use it or want to use it, would probably be very high."
- "...in the higher rankings, I think that they think it [NKO] is effective...once you get to...the first tour DIVOs and LPOs, it's very lucid that they are not effective."
- "I just think it's the bureaucracy...a lot of things about appropriation and the money and bringing certain—it's very political...it just kind of turns into this bidding war and the bidding war takes forever...LCS was something they dreamt up of in the late 90s...we just saw the first one in like 2011."
- "The way that particular group does their contracting...has a significant impact because they say that they don't have the means or the authorities to change it to match developments...but I would imagine I can say, your stuff sucks, fix it or I will go somewhere else."

➢ **Environmental Restrictions**

- "So, I would say mainly it's probably a security issue that prevents them from wanting to use more technology on ships or whatnot."
- **"**So now, I think before you fund a program, or you have a new start for a new program, what are the cyber implications that is going to have? Because we always thought about what are the life cycle costs, like to maintain it over the years, and like with a car, how many oil changes is it going to require, what kind of oil does it take, etc. Then, what are the disposal costs? We have always thought of that, but now we have to incur that—what's the oil—you know the oil change is going to cost, but also what if it gets hacked? How do we keep it safe?"
- "Then the cyber safe aspect, you are going to have all of this online training, and then how are you going to protect it?"
- "...[technology] is vulnerability in a lot of ways...you would have a lot of pushback from security point of view...would have a lot of people for it and a lot of people against it."
- "May hinder the ship's ability to kind of stay invisible."
- "So, if you have like E3/E4 he has got his tablet and its turned on, you know, it's kind of defeating the purpose of putting everyone in MCON. So, the more technology that you have, the more vulnerability or risk the is ship."

INDIVIDUAL RESISTANCE

- **Perceived Usefulness**
  - "...they hurried up and implemented a system without it being fully functional. They probably cut some corners out of it…"
  - **Unnecessary and Inhibiting Redundancy**
    - "I think over time when you start doing it for years and years you kind of memorize everything anyways"
    - "Every year it's the same thing."
    - "If you want people to take something seriously, you have to do a little...changes...because then people aren't going to take it seriously. They are just going to click through it."
    - "To me, once is enough or twice is enough...but a yearly thing I think it pointless."
    - "...like NKOs in general are kind of difficult to navigate and use and then its redundant, like the redundant training."
  - **Obsolescence**
    - "I feel like everything we have is so antiquated."
    - "The new technologies—what we accept today as good technology, in two days, two months, two years will be obsolete."
    - "I have seen one that was on my ship, it was just in the back corner collecting dust, but it was supposed to be like a ship board simulator and it wasn't being used because it was either obsolete or nobody knew how to use it."
    - "It's out of date content...some of the technology that we have been using is out of date, so it's like slow to access."
    - "They were shoving this technology down our throat, and making us fit the technology, versus the technology fitting us."
  - **Value**
    - "...as long as the technology is bringing value and people know what that value is, I think people...are more apt to adopt new things."
    - "...CBTs overall are not very helpful because you just click through to get done...Yes, you did the training and you take a test, but overall it's not helpful."
    - "…I think they [NKO] are not useful because the lack of interaction"
    - "We did not like it [CD ROM training] because the amount of interaction was severely hampered. If we had a question that was not specifically built into the program..."
    - "In the past, 12 or almost 13 years I have been in the Navy I can't say that any educational you know, benefit was given to me from online."
    - "Most of the time you can click through, and then sometimes they give you tests at the end, and sometimes they don't even give you tests...It's just pointless."

- "They all click, click, click. We assume that we already know this."
- "...we had much more of a profound understanding of what was being taught than whenever we were doing learn at your own pace, which was at that point in time, a CD ROM for rules of the road...it was a joke."
- "It's just waste of my time to go through like one hour content [on NKO] and take the exam...but they give you an unlimited amount...you could take it as many times as you want until you pass...So, why would I spend time on learning…"
- "Time is of the essence in the Navy...nobody wants to spend three hours doing training online when they can just have it face to face."
- "I think they [CD ROMs] were really big failures...once you get to a ship you have a lot of responsibilities...competing demands...I didn't really feel like I had the dedicated time to like sit down and really go through them...if I ran into things I had questions on, then I'd have to stop and go find somebody who knew what I was reading in the CD ROM...you didn't have the time to focus on it. Then when I did have the time to focus on it...I don't think the retention was very high when I was reading. I kind of got maybe a basic idea of whatever that topic I was looking at, but no one to really guide me through that process."

- **Check-in-the-Box Mentality**
  - "It really doesn't work the best, but it works...people may be clicking through the slides or whatever, but it's getting done. Like there is a check off...sometimes the Navy feels like there is more...bigger fish to fry ...gets put in the back burner."
  - "I am only doing this [CBT] because I have to, not because I am actually going to learn something from it."
  - **"**You are not doing it for me, you are doing it to cover your butt...I can check it off my block...if you don't care, then I don't care."
  - "...what I have seen them do is more of a check-in-the-box kind of thing...There is no value added."
  - "It was really a check in the box...They are tracking completion."
  - "What did you learn? You are checking the box. They are checking the box because they need to check their boxes...They are good; you are qualified...But, in the end, you don't know anything."
  - "Everyone does it the same way, everyone checks the box."
  - "The 'training' you know, is not really training. Its informing somebody. When you inform them, you know, they may understand for that moment, but then they will forget it shortly. We have got some smart people that just you know, can recall information, but yes, I think at the command level its more informing than training"

- **Realism**
    - "It [SWO simulator] is realistic...You are actually there doing the real thing kind of...that was really good."
    - "Then they also introduced something called a low-cost trainer...it was supposed to save money, but I thought it was more detractive, because it wasn't really the real thing...it was just not implemented well."
    - "...once I got on my ship and I was speaking to the department heads, they were like the simulation, it's not accurate..."
    - "The ship simulators are very realistic. They give you like a very good perspective and when you are in a ship simulator, you actually feel you are on the bridge of a ship so much that I actually got sick on one. They are very effective."
    - "They have a phenomenal simulator that you can use that's built into the actual equipment…you would have to walk through the exact steps you would in real life…that was extremely effective training."
    - "I laughed at their simulator because it was laughable. Absolutely laughable because they tried to mock up this bridge, and this bridge doesn't match what they are going to go back to. It's just this generic."
    - "It ties into its legitimacy. As a student/user, if you are presenting me a new tool that you want me to use, it better be better than the real-life experience, because anything less than that, it's just not worth my time and my effort..."
- **Training Deficiencies**
    - "You know, I think we used the word train too loosely in the Navy, where it's you know, I just informed you of something. You know, not train you. So, they gave a PowerPoint presentation to go through that, but it wasn't training."
    - "Even with the face to face training, you know, you go to these GMTs face to face, like I heard this a million times. I am here, but I am not listening."
    - "I think their job is there to qualify you, it's not to teach you."

➢ **Perceived Ease of Use**

- "...people don't like change. So, the main thing is, it's got to be user-friendly. If it's not user friendly, you are going to get a lot of pushback…"
- "The challenge is going to come I think from people...not knowing how to use the technology and becoming frustrated with it."
- **"**I don't see much pushback [with apps and training technology] because it's more…readily accessible, easier to do, which has helped."
- **"**That Navy Portal is awesome because it's a one stop shop...to become more user friendly, for personnel to go on this."

- "...it made it [NKO] very easy, like user friendly, when they implemented that [low bandwidth format] as opposed to making people have to do all of these trainings and then you have no internet or bandwidth to do it."
- **Minimal Effort to Learn**
    - "I don't think it was that much of a hassle. It really only took maybe I want to say ten minutes, but maybe less than that to learn."
- **Technological Issues**
    - **System Errors**
        - "It [a shipboard simulator] was definitely a relief to have...we could get everybody back into the mindset and back to the level of knowledge needed...but it was a failure of a system...due to the hardware problems...wish we could have gotten more value out of it."
        - "...A lot of stuff we have in the Navy is really old. So, anytime you are trying to upgrade it...Often, it puts in just as many bugs or things that make it really difficult to use. So, it's really not as much of an enhancement if people can't use it.
        - "if there is not a system that shows reliability and you don't see that it's a smooth system from the onset, I think that's where you kind of lose people the most..."
    - **System Complexity**
        - "We already see what's out there on the world-wide web...yet ours are so complicated and they don't work."
        - "...when they add more capability to existing technology, they make it more complex to use, instead of more user friendly, like apps on phones nowadays."
        - "...Because of the challenges with those platforms [NKO and TWMS], we spent so much time making sure that everyone checked the box, got their training done, and...if you multiply across how many people in the command, being able to log in or having to reset passwords and access...the technology, instead of being an enabler, became a hindrance."
        - "SWALIS is a little complicated. If someone wants to pick it up and try to figure it out, it's hard...there is online training that you go through prior to having your user account...I did the user training, but still it was mostly because of the glitches..."
        - "There were a lot of things that were not intuitive, a lot of workarounds people had to learn...a lot of people would become frustrated rather than learn it and actually get proficient."

- **"...**our generations up and coming were pretty intuitive when it comes to technology...but I think that the interface...the fact that it is so troublesome to just get to where it is you need to go, or get what it needs to do..."
- "...the only resistance could possibly be that sometimes technology can be kind of difficult to operate, the simulator is kind of difficult to understand and grasp in the beginning because everybody learns at different levels...resistance might be because they don't understand how the simulator, the system works..."

▪ **Limited Availability**
- "There's only limited availability of computers [aboard ships]."
- "For us on the ship, we were always trying to get the simulator time. The annoying thing about it was that...you would only have a certain amount of time allotted to you as a ship, which was frustrating..."

▪ **Poor Internet Connection**
- "Connectivity kicking you out...you can't do this, you can't do that"
- "There are constant network issues [aboard ships]. It just makes you hate the whole system. It makes you lose trust in the system."
- "NKO courses can take almost an hour to load before it actually works when you are out at sea. That will hinder people's ability and desire to complete training online.
- "...when I was deployed, it was really, really hard to get on to NKO and do our trainings...When you are deployed, it's slow, like the internet doesn't work...how am I supposed to click through all of these trainings?...a lot of people would fall delinquent in it."
- "...if you are underway and you have to do NKOs, it's basically a full day affair...it takes forever to load and crashes."

<u>STATUS QUO BIAS</u>

➢ **General**
- "I am seeing more and more Navy leaders say this is not okay as the status quo. We are not doing things as good as we can, and we need to make changes."
- **"**It's convincing the older people that there is some validity and to spend the money on research and personnel. The biggest issue that I have seen with technological advances is changing the mindset of people. It's not the money."

- "There are always tripwires...we are always taught, if you hear the phrase this is how we have always done it—question that."

- **Inertia**
  - "There's resistance to change because its change, and then there is resistance to change because it's wrong."
  - **Affective-Based**
    - "...it's the fear of the unknown and I don't know what I am doing kind of thing."
    - "They are not technologically savvy. Older guys are just not."
    - "...like some civilians and people who have been in the Navy for a long time are stuck in their ways of trying or wanting to try a new method to what they are already doing...already comfortable with...they don't want to try anything new because they don't have to."
    - "...to have five different case studies in one year, maybe complacency is a factor. Maybe we thought ourselves invincible, and at the end of the day it was just ticking time bomb…"
    - "...always reacting...Windows is not supporting Windows 7 and Windows XP and those things anymore, every command now is going to Windows 10...But, if that wasn't the case, we would still be using Windows 7, we would still be using Windows XP...the Navy always is one step behind."
  - **Behavior-Based**
    - "Then you had the old school back in my day...Those who are uninformed and who are closed minded about what technology can do for us, those are a problem in their own right."
    - "...change is not always accepted right off the bat...in our organization, we know that it takes time and a lot of people are resistant because they are used to things being a certain way...This is not how we do business...but sometimes old ways aren't always the best ways as we are moving forward."
    - "It was very much this is our standard, don't look into it too much, just do it."
    - "People who are higher up in the organization came up in a certain way...this is how we trained, this is how we did it. So, I think if you implement new ideas, I think there is definitely going to be some resistance on an organizational level."
  - **Cognitive-Based**
    - **"**No one thought it was possible...we were pretty much backed up to a wall, and had to come up with an idea real quick, so that's what we did...There was a lot of resistance...even up to the point where we had this system working..."

- **Habit**
  - "I guess it is built into their daily muscle memory...Because they are comfortable in that state, they don't want to try anything new..."

- "I want to say there is a kind of command presence against using the technology just because of over-reliance of it."

- **Rational Decision Making**
  - "...I am resistant to any change...more so, with the change in technology, because now I have got to take time away from doing something I need to do, to learn this new technology."
  - "People are going to be more resistant if it's difficult to learn."
- **Psychological Commitment**
  - **Risk Aversion**
    - "I think the hesitancy to do it, A, longevity, B, not wanting the be the guy that sucked, and then C, why rock the boat if it already works?"
    - "The people who are worried about covering their you know what's ...The safe play is to use the existing technology versus to invest in what's coming next."
    - "...When I worked in Millington...Anything you wanted to do [people would say] it's going to be another [DIMARS]...it was supposed to be this great solution that would solve a lot of problems, a lot of resources, money and people were put toward it. The story was it failed."

<u>BENEFITS</u>

- **Organizational**
  - **Enhanced Speed to Capability**
    - "Advantages were time, resources, individuals could hone their skills without necessarily having to have like the entire crew or doing an entire evolution...it [simulator] gives people a lot more individual opportunity to sharpen their skills, and we can do it 24 hours a day."
  - **Reduced Training Cost**
    - "But, it [the simulator] is the most cost effective way to have the experience without having the experience."
- **Individual**
  - **Improved Quality of Life (more free time)**
    - **"**You allow the sailor or individual to do it at their own time...it's not regimented like you need to come to this and do it..."
    - "...make life a lot easier to complete the training..."
  - **Personalized Learning**
    - "I think there is a good amount of people that may be geared toward interactive learning."
    - **"**Everyone learns differently, and some people find that [CBTs] is a benefit..."
    - "...the advantage of [cove] is that...you kind of get personal one on one time when it comes to learning. If that's the way you learn, like me, you learn better in that environment and [cove] is definitely a better learning tool than just a team simulator."

- **Job Preparation**
  - "The use of [flight] simulators...was very useful for practicing different scenarios for emergency procedures, limits...in preparation for flights prior."
  - "...I had never been on the ship...but we had simulators for driving the actual ship which helped me a lot with training, because when I got on the ship I was like okay, I know...that from the simulation."
  - "I felt like it was more ingrained...I know what to do because of the simulation."
  - "There is definitely an emphasis on augmented reality, virtual reality systems...[Cove] kind of falls into that category...it's a huge help to anybody that doesn't know anything about ship driving...or standard commands...it's a positive way forward in the Navy.
  - **"**There is low risk and it gives you the opportunity for repetition, it gives you the opportunity to learn what works and what does not. So, yes there are uses, but real world, it does not take the place of real world scenarios."

RECOMMENDATIONS

- "...it kind of concerned me from the SECNAV and CNOs congressional testimony . . . discussing the DDG collisions and they said we need to invest more in simulation and . . . technology . . . that sent off bells and whistles, because sure you are saving money . . . but at the same time, you are losing the quality of the training because there are some things that [require face-to-face]"
- "[due to the] sensitivity or the importance of it. its worthwhile to get together in person—not because the technology is going to hold you back or be a roadblock in itself."
- "Be more proactive than reactive."
- **Bureaucracy/Red Tape**
  - **"**Let go of the reins, accept failure, accept that failure is going to happen. So many of our schools, its 100% throughput. It doesn't matter if you have passed or not, its 100% throughput. Again, all of this is stemming from leadership creating an artificial demands signal and an artificial push that does not always necessarily have to be there."
  - "Yes, basically retract the fiscal restraints. Basically, when I hear of like people the higher ups say you need to be innovative, that just means we need to do better with no money. With less. You need to do more with less, basically."
- **Training**
  - **Convey Importance**
    - **"**It wasn't adequately explained to the average sailor. Like E3 Johnny didn't grasp it. he didn't get onboard with it."
    - "They are like oh, everybody needs to come to this training, but when you go to the training, it's like oh, you don't need to be here. Well, that kind of irritates somebody like me, because once again, is it important? What do you want to deliver to us? Do we need to—you know, what do we need to know? So, then you go in and

you read it yourself and you realize that you don't need to do nothing because you are over that point. So, that goes back to the example of like what are you trying to get across and make sure you are clear so that the users know like the importance of it."

        - **"**It's important though to, even though there is going to be some resistance doing things differently, maybe the upper chain of command has done it before. I think if they see the value in it, and that can be communicated...say why this is a good system and how this will benefit the sailors, then I think it can and will get accepted at an organizational level."
    - **"**They had a school onsite to teach people additional skills, or to shore up and say hey, you are not as good at this, go do this program for a week and then come back."
    - **Provide Adequate Training on Product**
        - "I think there is resistance when a new technology comes along and there is not formal training for it. So, if it's something that—like if we install a new system and then the maintainers are expected to just read the book or talk to each other about it, you know, and just try to figure it out on their own, I think that produces much more resistance than if we say here is this new thing, let's all go to class and learn about it. Someone who actually knows it already, again, having that expert, somebody should be proficient with it, to convey all of the nuances of using it."
        - "It [tech resources] may be available, but they are just not really advertised …I think as long as the students know it's there, they will use it."
    - **Group Training**
        - **"**I think group—people. Put like the technology in a room, and go through with the group. That will force that group to listen and then we all go through and the officer or chief in charge could not click it through."
        - **"**You are with other people. I think that's a major thing. You are with other people...it forces you to rethink. You are an officer and honor, courage, and commitment, and do what's right."
- **Apps**
    - **"**One of my positive things was the navy now does some of our online trainings on the app. So, instead of me spending you know, 30–45 minutes on AKO or NKO rather, my app, I am do the same training and I take about 30 minutes, and I you know, I will still kind of maybe not completely give my 100% attention, but at least I pay more attention to it than I do just sitting there because I was like okay, you are taking the time to actually try and do something that makes my life a little better, then I will give you back the same respect that you are obviously giving me, because you are trying to meet me halfway. So, I like that, that's my positive."

- **“**Even having an app you could literally do it from anywhere, you know, you don’t have to say I am going to wait or there is really no wait. It’s very convenient for anyone to be able to accessibility and through the use of technology, it’s made it very easy.”
- **“**If we don’t know more, we are going to an app ...it’s very accessible and the information is out there, and the user is going to go and seek the information.”
- “It’s [Supply Officer App] very relative... Its pretty helpful, because there is so much information that you can access just right here, that you don’t have to wait until you go to a computer, you don’t have to you know, its at your fingertips. That’s good, because it makes everybody smarter.”
- **“**I think I saw more completion with the apps. The only thing it maybe took a little longer with the app, or maybe it didn’t go through saying they had completed, because of the technology on the engineer’s end, and not so much on the users, but the users, they definitely used the app more.”
- **“**I would definitely go with the app. I think that’s more people—even older people—are using their phones more, and I think the app is pretty easy, simple, and you can do it from your phone, your iPad, whatever you have, it’s definitely more convenient.”
- **“…**if I was learning a language and they had an app that I could use and it was easily accessible and say I gave them my military email address, they gave me an account, so that way it’s secure, that would be something that I would really enjoy as having that I could have on my smartphone… maybe you are on transport or like a train or something and you are going to work, and it gives you time to do that training and knock it out. So, I think that provides a pretty good basis for trying to get training done by everyone and making it easily more accessible.”
- **“**Slack [an app] does come to mind,...it shared on both sides, but I certainly appreciated it. I felt it met the goals of Sakai; but was more flexible and easier to use on the mobile side, and the computer and for—a lot easier without the constant log in and even for files like video, audio, and pictures. I think it was more readily used by the whole group to facilitate in collaboration.”
- **“**Maybe that more formal training is required for some of the most important work we do in the military, but for a lot of the training that today we have to do through NKO, or you know, even sitting in the auditorium out here at NPS, probably could be achieved through much more nimble and mobile methods of delivery.”

➢ **Tests (Measure Training Effectiveness)**
- **“**I mean if somebody can understand the advantages that we can get from implementing something. So, these people are going to have to test on their own and that’s the only way they are going to be able to see how it actually helps. You know what I mean? So, just the use, the experience of using that new technology will help open their eyes, I think.”

- **“**I think it would be more effective if you actually got scores and like oh, you got that wrong, better luck next time, but you could complete the training. I think that would be more effective, people would listen more if you actually needed a passing score.”
- “Like after the training and then give them a physical test.”
- “Tests are really the best way to you know, measure the knowledge retained at the end of the training.”
- **“**I think that it would be beneficial if after they tool like a survey—they did take surveys, but I don’t know how they actually listened to the surveys, how useful it was and what changes they could have made.”
- **“**You definitely have to have the data . . . that says this works. The statistics showed this and this. You are not just going to get it to happen by word of mouth.”

➢ **Feedback/Buy-in**

- **“**Those E5/E6 who has that great depth and breadth of knowledge, must be involved in the communication process.”
- **“**There is a breakdown of communication that needs—horrible breakdown of communication that needs to be resolved. It stems with leadership’s not understanding what the warfighter is dealing with. Not understanding what the instructor is dealing with. Not understanding what the student is dealing with.”
- **“**Some E5 and E6s...have the level, they have the breadth and depth of knowledge to know exactly what that plan can and will do, but yet they are confined to teach certain things.”
- **“**I think feedback is always the way to go because a lot of times the navy has a way of designing things and just throwing it out there, and they don’t get the proper feedback from all the way down to the bottom and then they realize that they made a mistake, or they don’t utilize the people’s creativity.”
- **“**I think everybody’s perspective should be taken into consideration. It would be awesome to get everybody’s opinion and point of view and take them into consideration because it might have made life a little bit easier when designing the website.”
- **“**I am not sure they spoke to the end user on that one. I really don’t think so. Because if they had, they would have seen that—they would have gotten a lot of pushback. But, they were looking at it from a financial—they were looking at it from a very broad view, which I expect people in those positions would, but since it directly affects the end user, they should have, I think they should have--maybe they did, but they should have been a little more—they should have tried harder.”
- **“**I wish that the navy was set up where the SECNAV and those higher ups would say here is what we want to do, go do it. I wish that the fleet commanders would implement the things, versus the level higher up…there are certain elements in the navy that they just don’t know, or that would be like me commenting on.”

- **“**I can say hey, we are not going to kick people out for PT anymore. But, then I can say come back to me in three months, and tell me how best to implement that. How best to sell it. You are going to do it, but tell me how to best—what’s the best way we need to sell this?”
- **“**I would solicit—like you guys are doing, solicit more ideas from the actual users. The people who use it. I mean like just going back once again to technology and like even the—I think we are so behind... let us use everything that’s available out there.”
- **“**I see a lot more encouragement for experimental learning and then taking those risks and determining what does and doesn’t work... I saw the curriculum change from based on student input.”
- **“**They are definitely not anywhere remotely close to the buy in that our community is, at least from my personal experience.”
- **“**I think you can get buy in. I think you have to give dedicated time to learning too. I think that’s part of it. when you throw that on top of all of your other responsibilities and say hey, just go at it, you are not going to get the buy in. even if it was limited a little bit, but at least they gave you the dedicated time to hey, here go and do this training, where you can just put all of your focus on this training.”
- **“**I think giving the why of why you are doing things is important to get that buy in. you know, I think a lot of times the navy says okay, here is a new policy and go do it. I think they can do a better job of ‘hey, here is why we are doing it, here is why it’s important that we are doing it.”
- **“**I think it’s important to educate people at different levels in the chain of command. To hey, here is the technology. Here is kind of the goal. Here is the reason we are doing this. I think you need that synergy, but you know, you need that—I don’t want to say buy in, I keep saying buy in, but buy in at the different levels of the chain of command...Communicate to all levels at the chain of command what they are trying to do.”
- **“…**it has to give enough feedback about what you know, so you want it to be difficult, but not too difficult to where you are not grasping what’s being taught. You need basically, like I said, feedback at every step. So, how much did you learn about this, let me test your ability, what do you know. If the student sees that he or she is you know, getting better, then they will more likely increase their studying time or continue with the training.”
- “Like I would change kind of like how the higher ups are thinking that certain things are affecting deck plate people.”
- **“**But, I would rather go to a new training with you know, fresher stories, fresher incidences, case studies, things that I am like wow, that doesn’t sound like a big deal, but then ship x did it and you know, sailor ABC and got screwed because of it. Like, so if you kind of pull it into a real world situation, and you hear fresher stories and fresher things that are kind of more tailored to like what you are doing, it might be a little more impactful.”

- "…when it comes to technology, it needs to be built alongside people that actually do the job…an outsider…doesn't understand the details. When they build that technology and the end-user gets it, [they think] oh this is crap…when it's been built alongside the people that actually are the end-user, and they have their inputs, it's a better program."
- "SPAWAR and I would kind of like to see what they do and—you know—all the whole—you know—planning to implementation piece. I don't know the details, but I honestly think they need to be more hands on and going to the ships and talking to the end users."
- "This is valuable training, you definitely got the buy-in from people . . . because this is what the real-life situation is going to be."

➢ **Sell the Product**
- **"**To be able to sell the instructors and show them how this is going to benefit you and how it's going to benefit your students. Because, while this is—I am speculating with this—every instructor I have ever met who has been an instructor in the navy and who is actually done at least an adequate job, they have such a great desire to ensure that their students do well. [JO1] If you show me as an instructor how a system is going to make my life better as an instructor so that I can make sure that their life is better, oh yes. I am onboard."
- **"**Selling includes a full, proper, and elaborate explanation of not only what it should do, but what it can do, both positive and negative."
- **"…**like I said, if I know how this is going to—and I mean this is [Malzoff's] hierarchy of needs, but if I know how it's going to affect me, then I know how it's going to affect my immediate circle and then how its going to affect my broader circle. I understand all of that, and I truly do understand it, yes I am going to be much more willing to accept that."
- **"**There is a certain amount of faith that goes into a new paradigm, a paradigm shift and you have to sell people on it. you really do. This five-vector model thing, we didn't sell people. It was great idea, but we just didn't sell people on it. You didn't sell people on taking the rates away. You didn't tell us why it would be good for it. They tried, though. They said well, it will give us an opportunity for cross training and you know, you will get to do things you don't normally do. But, they didn't make that clear. They didn't accentuate that. The big headline was we are taking your rates away. They just didn't sell it right."

➢ **Accessibility**
- **"**I think the only positive move is that there will be some form of upgrade to make it more accessible—accessibility actually."

➢ **Incentives**
- **"**I think from the enlisted guys, maybe not so much the officers, for the enlisted guys, you can't ask them to do the things we do and not compensate them for it. Whether its financially, or training, education, I think it's unrealistic to expect—it's unrealistic."

- **“**So, maybe incentives only for the training that’s not as popular, let’s say.”
- **“**Higher up people know. But, to junior—that I experienced, the junior people think damage control is not so important. To them... it doesn’t promote to the next pay grade.”

- **Pilot Programs**
  - **“**Honestly, I think you get something out there and then you can tweak it as time goes on, as long as you have the money to do that later on…Get feedback. Like a full feedback loop, because you are going to have instructors out there too that are able to provide you feedback on whether it’s working or not. Whether the students are learning what they need to learn. Then, be ready to implement it.”
- **Quality Assurance**
  - “...it was put out there with good intentions of being able to go push and touch switches, but if you are going to have it be a representation of what is actually out there, you need to actually make the switches the same shape and you need to have the boxes look the same.”
  - **“**Do more open off the shelf type training, stuff that already exists. No reason to reinvent the wheel. I mean a lot of it just goes into program acquisition and how they fund the training to begin with. If it’s an afterthought, then it’s going to be a poor product. If it’s something that’s thought out early on in advance, it’s going to succeed. So, I think as early in the process as you can, you need to get the information out…”
- **Supplement vs. Substitute**
  - **“**I wanted to see a more strategic picture to understand am I maneuvering... None of that was available in that scenario because the computer was only—the program was only written with just you and another ship and you were not told anything else.”
  - “I think one of the big detriments in that technology [CD Roms] is just you are reading this, but there is not like the subject matter expert. There is no one guiding you there.”
  - “I think you need more hands-on experience and you know, you have to have a way to be able to ask questions.”
  - “It was a combination—it was a really robust training system type simulation...but also mixed the expertise of someone who was a qualified engineering officer.”
  - “[With the simulator] You obviously make mistakes and screw up, but you also... have somebody who was training you too.”
  - **“**Having a tool, an asset for me to use that allows me to still convey a similar amount of knowledge but allowing me to multitask, is a—in a vacuum, it is a good thing. However, there still needed to be someone there to—for me to raise my hand as a student, there needed to be someone there to raise my hand, if I raised my hand, I had a question for clarification, that went beyond what the computer program could tell me.
  - **“**There is nothing that is going to replace an instructor.”

- **“**There was a missed opportunity for training at that point in time ...The computer is not programmed to be able to answer that question. However, someone who is actually experienced, an instructor who is fully qualified is going to say oh, I see where you are going. Clarify the question like you and I are doing right now, where you are clarifying and making sure you understand what you are asking me. Then, answering the question and then there is a much deeper and more robust learning environment at that point.”
- **“**They are more willing to listen to a person who has an idea to say hey, we could do this as an augmentation or as an enhancement to what is being taught by an instructor.”
- **“**I think that class time is needed, that one on one sometimes. Its needed. I think a lot of times the navy tries to cut costs or move fast, and they have these like a fire hydrant they shoot it to you, they want you to spit it out and you just are running and like so many unknowns. I think that class is definitely necessary for the hands-on experience.”
- **“**I think that some things require face to face. Some things require technology. It needs to be a little bit of both.”
- **“**Some things could be—you could simulate, but I think the majority of it we should keep hands on.”
- **“**I think operationally I think they are good basic tools. These simulators. But, I don’t think operationally it doesn’t give the whole—because there is a psychological component to being operational, and you cannot substitute for that...I think there’s a certain psychological component to operations that trainers don’t compensate for.”
- **“**I think the technology allows it to be a secondary source like to face to face training, like a good back up reference.”
- **“**I think they need to supplement the brick and mortar schools... I think it needs to be supplemented by subject matter expert, or its—you are not going to have as effective training without that. I don’t think you just say ‘hey, here is this technology, there are no people involved’, and I think that’s a recipe for disaster.”
- **“**I think there will always remain types of training and education that technology can’t replace the value of that in person time, but I would think that would be for the reason of the good content and appropriateness of the face to face.”
- **“...**then make it as hands on as possible instead of all of these computer things . . .”
- **“**Easy to use, it was—the instructors, they were there to help, the sim [inaudible], and also students were prior to us who were farther in the program, they were very helpful to, so they were a great resource to help us figure out what we need to—how to run the simulator.”
- **“**I think that the CBT should be used as like a supplement. It shouldn’t be—I feel like the one on one training that you have is valuable and there is a reason why we still use it until now.”

- **Tablets/IPADS**
  - **"**I think that things could be—could change faster if the navy did something closer to like the civilian sector as far as—if we used more off the shelf parts like—and more interfaces that people are already used to kind of...I guess there is the movement to go toward iPads and things like that in the navy because everyone coming into the navy already knows how to use those things."
  - **"**I think people would be more motivated to grab one of those, rent it, do their training when they are in their rack at the end of the day instead of working 12 hours straight and then getting you know, their break time and just having to stay at work or at their workspace to do NKO on training."

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