INVESTIGATING MILITARY INSTRUCTORS' EXPERIENCES WITH STUDENTS' USE OF PERSONAL TECHNOLOGY: A PHENOMENOLOGICAL STUDY

by

Scott Migdalski

Liberty University

A Dissertation Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

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ABSTRACT

This transcendental phenomenological study examined the teaching experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution located in the southeastern United States. Employing Dewey's social transmission theory and Mezirow's transformational learning theory, this study answered the central research question: How do military instructors describe their teaching experiences when incorporating student-owned devices into teaching/learning activities? Guiding questions sought to address instructor modifications to their teaching practices in pursuit of productive student collaboration and discourse in response to students' use of their personal devices in the classroom. Purposeful sampling was used to recruit 12 participants who experienced the phenomenon while serving as an instructor in an institution which permits the use of student BYODs in the classroom. Data were collected through a qualitative survey, interviews, and focus groups, and analyzed using phenomenological reduction processes to develop themes and insights into participant responses. Four themes emerged to answer the research questions: adopting a BYOD culture, student primacy, BYOD instructor attributes, and learner ownership. The findings corroborated and extended prior research with a better understanding of how students' BYOD-use impacts military occupational training instructors. This study may also inform a practical application by understanding how instructors describe their experiences, and how they are hired, developed, placed, and sustained in DoD institutions which enable student BYOD-use. Future research should consider a broader group of participants and the inclusion of quantitative methods.

Keywords: military training, student Bring Your Own Device (BYOD), social transmission theory, transformational learning theory, student collaboration, student discourse, student devices

Copyright Page

Dedication

This dissertation is dedicated to my wife, Jenny, who consistently supported me through this process with her love, prayers, and encouragement. Her wisdom and patience sustained my progress, especially during the most challenging phases of this project. I remain eternally grateful for the many blessings which Jenny has brought into our lives.

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To the participants of this study who gave generously of their time and attention to share their experiences: Your contributions made this research possible. Finally, thank you to all civilian, uniformed, and contractors who serve as military occupational and technical training instructors. It is your shoulders upon which the DoD uniformed services stand. Without you, there is no force of the future.

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List of Abbreviations

Bring Your Own Device (BYOD)

Computer Fraud and Abuse Act (CFAA)

Department of Defense (DoD)

U.S. Air Force (USAF)

U.S. Army (USA)

U.S. Navy (USN)

U.S. Marine Corps (USMC)

Secretary of Defense (SecDef)

CHAPTER ONE: INTRODUCTION

Overview

The purpose of this transcendental phenomenological study was to describe the essence of the experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution located in the southeastern United States. This initial chapter articulates a background of the problem which inspired the purpose of this study. Following the background, other sections include the situation to self, the problem statement, the purpose statement, the significance of the study, the study research questions, and a listing of definitions for terms used within the study. The chapter concludes with a summary of the introduction to this dissertation.

Background

Smartphones and other personally owned digital devices have been integrated into the lives of today's students (Wang, Wang, Gaskin, & Wang, 2015). Murphy (2011) coined the term "post-PC devices" (PPDs; p. 19) to refer to the latest innovations in personal computing, such as the iPad, Android OS devices, and laptop-hybrids. The growing practice known as "bring your own device" (BYOD) refers to a model in education where learning institutions permit students to use their personal technology to support their objectives (Alberta Education, 2012). While using their devices primarily for data gathering and social connectivity (Lee, 2015), students also favor their use in the learning environment (Pew Research Center, 2015). Inspired by students' desires, higher education leaders seek to leverage the information gathering and social connectivity capabilities of personal devices, while sustaining a stable learning environment which protects students from overuse of the devices (Reese-Bomhold, 2013), and guards networks from unnecessary vulnerabilities (Castro et al., 2013; Ghosh, Gajar, & Rai, 2013).

Similar to the proliferation of BYODs in higher education, the emergence of personal device use in the military environment is becoming more popular (Edwards-Stewart, Smolenski, Reger, Bush, & Workman, 2016; Foster, 2016; Roy, Highland, & Costanzo, 2015; Lendon, 2016), to include leveraging the devices as part of an enterprise-wide talent management system for recruiting, compensation, development, and retirement (Carter, 2015). This pathway has been amplified by each of the service components through individual operations plans which seek to extend technology to enable the delivery of education and training when and where needed. While the U.S. Department of Defense has published its vision for the future of the military education and training, to include the role of technology in supporting that vision across the enterprise, there exists only islands of excellence where technology is used in pursuit of delivering personalized learning just prior to the point of need.

Historical

Classroom teachers have varied in their endorsement of integrating student devices into the learning environment. Novice teachers have sought to explore the possibilities which the technology offers, while experienced educators have been cautious about overuse (Kafyulilo, 2014). Regardless of where educators have fallen on the range of BYOD acceptance, the use of student-owned technologies has emerged through modified institutional teaching and learning strategies (Farley et al., 2015; Marcoux, 2014). One example of these strategies is the use of student response systems within the classroom environment, commonly referred to as clickers (Cacchione, 2015; Hao, 2016; Imazeki, 2014). These devices initially enabled students to participate in classroom discourse by way of a communication method which paralleled verbal responses and hand-raising. As the use of student devices evolved to include personally-owned technology, the response capability also expanded to include text messaging and the use of web

browser applications. By 2015, most higher education students arrived for class armed with both their personal technology and the expectation to integrate their devices as a classroom engagement, collaborative, and support component (Biddix, Chung, & Park, 2015; Kong & Song, 2015). While not considered a civilian college or university, the Department of Defense (DoD) is nonetheless a prolific education and training organization, whose trainees are sourced from high schools, colleges, and universities.

Students at DoD schools share BYOD desires similar to their civilian counterparts, while military school leaders share student BYOD concerns similar to those of civilian educational institutions (Curran, 2014). Across the U.S. military education and training domain, there are hundreds of schoolhouses which do not operate under a unified command, but rather under distributed control authorities. Use of student-owned technology across this learning domain continues to migrate from prohibited to permissive, mediated principally by leadership concerns for vulnerabilities to network security (Edwards-Stewart et al, 2016) and student distractions (Ravizza, Hambrick, & Fenn, 2014; Risko, Buchanan, Medimorec, & Kingstone, 2013; Sana, Weston, & Cepeda, 2013). The DoD continues to make progress in developing alternatives to physical authentication requirements (Curran, 2014). Alternatives include derived credentials loaded to their mobile devices so that they have access to their network certificates ("DoD Mobile Technologies," 2017, para. 4). The certificates allow the organization to control the permissions of student devices through an aperture of when and how student applications are used to support learning, and to sustain network integrity standards ("DoD Mobile Technologies," 2017). As DoD senior leaders continue to engage enterprise-wide network security alternatives, some military schoolhouses have partitioned their networks to enable students' BYOD access to curriculum and collaborative teaching learning activities (Crane,

2017; Foster, 2016; McElroy, 2017; Roy et al., 2015). Other military school leaders, through their concerns about the negative effect of student distractions, have prohibited student BYOD access while in training (Carter, Greenberg, & Walker, 2017a). The literature supports leadership decisions which both endorse and prohibit the use of student devices in the military classroom.

Social

While student BYODs are used primarily for data gathering and social connectivity (Lee, 2015; Pew Research Center, 2015), civilian educators are simultaneously supportive and cautious about integrating student BYODs into learning environments (Beland & Murphy, 2016; Kafyulilo, 2014). DoD senior leaders share both this support and concern for student devices and are developing pathways to sustain network security while permitting student BYOD access to military classrooms. In the interim, some military school leaders, seeking to facilitate students' BYOD access to collaborative teaching learning activities, have recently made modifications to their networks which allow limited BYOD connectivity (Foster, 2016; Roy et al., 2015). In these cases, military students are experiencing positive learning results with flipped classroom strategies (McElroy, 2017), on-line team-based exercises (Crane, 2017), videos and educational games (Hebert, 2017), and blended logistics short courses (Develop the Force, n.d.). Other military education leaders who are concerned with degraded student performance associated with student-device distractions have decided to prohibit BYOD into their classrooms (Carter et al., 2017a, 2017b).

The institutional site selected for this study is rare when compared with other military schools found in the literature; this school operates one of the few military training programs which has embraced the classroom use of student-owned devices as part of its learning

environment, rendering the experiences of its instructors unique among its peer service schools.

Theoretical

While the literature offers a variety of perspectives on the use of BYOD in civilian teaching and learning environments, no studies have been conducted that describe the classroom experiences of military instructors who leverage student BYODs in their teaching practices. Students' use of the devices has been described as focused on social interaction (Lenhart, 2015), course-related information searches (Law, Thome, Lindeman, Jackson, & Lidor, 2018), student collaboration with peers and teachers (Santos, Bocheco, & Habak, 2018), and as a referencing tool within learning practicums (McNally, Frey, & Crossan, 2017; Van Daele, Frijns & Lievens, 2017). By narrowing the aperture of student BYOD-use to focus on student interaction, this study was designed using the lens of selected learning theories, which focus on the significance of student-to-peer-to-instructor collaboration and discourse. By employing Dewey's (1916) social transmission theory and Mezirow's (2006) transformational learning theory, this study employed a transcendental phenomenological methodology to describe the experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution. This research seeks to inform institutional policy leaders on how student BYOD policies have impacted military instructors' teaching practices and the classroom learning environment.

Situation to Self

The design of this study was inspired by the subject institution's decision to leverage the use of student-owned devices in the military teaching and learning environment. While the DoD leadership continues to build the pathway toward enterprise-wide personal technology use and civilian educational institutions continue to move toward greater integration of the devices, it is

anomalous that only a few military learning institutions have operationalized student BYODs. As a result of implementing student BYODs, military instructors assigned to the school within this study have modified their teaching practices to leverage the devices toward encouraging student collaboration and effective classroom discourse in support of learning objectives.

As an educator and novice researcher, I approached this study from an ontological viewpoint of reality, which was grounded in a social constructivist framework (Creswell, 2013). My assumption was that the instructor-participants within this study possessed personal perspectives of what it means to be a technical training instructor. Both my own and the participants' realities were constructed through our lived experiences within the environment (to include one another); multiple realities existed based upon the diversity of lived experiences (Moustakas, 1994). In my present position as a Director of Education and Training for the U.S. Air Force (USAF), I rely heavily on the experiences which I gained in various developmental positions throughout my career. These developmental experiences have exposed me to the individual components of the USAF Technical Training System. These positions focused upon managing the instructional subsystems of manpower, facilities, equipment, and budget. While I retain a robust professional background in these sub-systems, my personal philosophy has been to focus these sub-system outputs on enrichening the relationship between the instructor and the student. I believe that this relationship serves as the foundation of military training efficacy, and that absent of the instructor-student relationship, the peripheral instructional sub-systems would serve little purpose. For the study participants, their lived experiences associated with student device use in a military training environment drove a variance in their unique realities. My goal in pursuing this study was to obtain the essence of the realities which the instructor-participants experienced, and to describe those experiences.

Problem Statement

Teaching and learning through the leveraged use of mobile technology continues to develop and proliferate in civilian and military educational institutions (Duy & Pittayachawan, 2015; Flavin, 2016; Jones, Chin & Aiken, 2014). The use of personal devices is prolific among adult-age students who integrate personal laptops, tablets, smartphones, and wrist technology into their lifestyles (Lenhart, 2015; Statista, 2015; Swanson & Walker, 2015; Wang et al., 2015). While student devices are being used reliably for data gathering and social connectivity (Lee, 2015; Pew Research Center, 2015), civilian educators are simultaneously supportive (Cristol & Gimbert, 2013) and cautious (Beland & Murphy, 2016; Kafyulilo, 2014; Sharples, 2002) about integrating BYOD into their learning environments. As the DoD increases its capability to accommodate student devices on its networks (Curran, 2014; "DoD Mobile Technologies," 2017), several schools have developed positive BYOD perspectives similar to their civilian counterparts (Crane, 2017; Hebert, 2017; McElroy, 2017). Other military training leaders, because of concerns over student distractions, have elected to not introduce the devices into their classrooms (Carter et al., 2017a, 2017b). The literature supports both styles of leadership; those who support and those who prohibit student-owned device use in military institutions. The problem is as follows: While the body of literature on BYOD integration in DoD schools continues to expand, there is a gap in the literature regarding the teaching experiences of military instructors assigned to schools that have implemented student BYOD-use.

Purpose Statement

The purpose of this transcendental phenomenological study was to describe the essence of the experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution located in the southeastern United States. The

existent literature citing the use of student devices within the military institution has been rare, focused on student outcomes, and not inclusive of instructor experiences. Guiding this study were John Dewey's (1916) social transmission theory, which focuses on collaboration within the classroom environment, and Jack Mezirow's (2006) transformational learning theory, which extends the social transmission theory within this study by focusing on educators' transference of authority of a learning group to the group itself, in pursuit of active, critical, and reflective discourse within the classroom. The relationship between these theories and the focus of my inquiry was to examine if the inclusion of student device use had inspired military instructors to modify their teaching practices in pursuit of establishing and sustaining a collaborative classroom environment which supports productive student discourse.

Significance of the Study

The employment of student-owned technology within the classroom continues to proliferate by way of the BYOD phenomenon (Armando, Costa, Merlo, & Verderame, 2015; Singh, Chan & Zulkefli, 2017; Traxler, 2016; Van Dyke & Smith-Carpenter, 2017) concurrent with the expansion of mobile learning technologies. However, the perspectives of teachers who support student BYOD (Gillies, 2016; Song & Kong, 2017; Weber & Barth, 2016), and those who object to BYOD-use (Ahmed & Parsons, 2013; Lenhart, 2012; Thomas & O'Bannon, 2013; Yanjie & Siu Cheung, 2017; Song & Kong, 2017) remain divided. The military education and training domain has not yet reached the proliferation experienced by civilian institutions and can therefore be considered more emergent in BYOD-use (Dede, 2013; Hill & Babbitt, 2013; Scoppio & Covell, 2016; Wyche, 2014), largely focused on military medicine skills training (Friedl & O'Neil, 2013; Ka-Chun et al., 2016) and cadet training (Carter et al., 2017a). While the use of student BYODs in classrooms is empirically supported (Castillo-Manzano, Castro-Nuno,

Lopez-Valpuesta, Sanz-Diaz, & Yniguez, 2017; Cheng, Guan, & Chau, 2016; Cochrane, Antonczak, Keegan, & Narayan, 2014; Kong & Song, 2015; McClean & Crowe, 2017; Newhouse, Cooper, & Pagram, 2015; Yang & Che, 2015), this study holds empirical significance since qualitative inquiries into the teaching experiences of military instructors who teach within classrooms that employ student BYOD-use has not been previously researched. The results and conclusions of this study may inform leadership decisions regarding the implementation of student device policies and the selection, preparation, and placement of military instructors assigned to institutions that permit student device use.

In addition to describing the essence of the instructor participants' teaching experiences with student devices, this study also further illuminates Dewey's (1916) social transmission theory and Mezirow's (1991) transformational learning theory. Much of the literature on leveraging student technology to support student collaboration and discourse (Breen, 2015; Crossouard & Pryor, 2009; Raikou, 2016; Rogers et al., 2016; Stansberry & Kymes, 2007) is focused on the institutional migration toward implementation of student BYOD-use (Angeli, Valanides, & Bonk, 2003; McNeill, 2012; Yang, van Aalst, Chan, & Tian, 2016). Since the age group of the students attending training at the subject institution falls into the demographic description of "millennials," who are characterized as digital natives (Much, Wagener, Breitkreutz, & Hellenbrand, 2014; Swanson & Walker, 2015), much of the literature suggests that millennials strongly favor the use of technology to socialize and collaborate (Clegg, Hudson, & Steel, 2003; Gikas & Grant, 2013; Kanuka, Rourke, & Laflamme 2007; Mossman, 2012; Otero et al., 2005; Rourke & Kanuka, 2007; Ryan, 2011). This technology use serves to support discourse within a learning community (Barber, 2011; Geelan & Taylor, 2004; Lee, Carter-

Wells, Glaeser, Ivers, & Street, 2006; Liang, Ebenezer, & Yost, 2010; Taylor, 2000; Vaughan, 2004).

Student collaboration and student discourse serve as learning enablers (Howlett, Ferreira, & Blomfield, 2016) and may be leveraged through student technology to support teaching strategies (Mezirow, 1998). These two learning theories also apply to military instructor duty preparation in that pre-service instructor training emphasizes the use of permissive learning environments through student collaboration and discourse (U.S. Air Force, 2003; U.S. Army, 2018; U.S. Navy, 2010). What the literature on social transmission and transformational learning theories has not examined is the teaching experiences of military instructors who leverage student devices in their teaching and learning activities. This study also serves to inform military training stakeholders (instructors, policy writers, institutional leaders) who are exploring the potential of BYOD for their schools because of the practical significance of collaboration and discourse within instructors' educational practices. Additionally, this study extends the literature regarding military student BYOD-use policies, instructor's integration of the devices into their practices, and suggests further areas of investigation.

Research Questions

This study focused on the teaching experiences of military instructors and investigated the essence of their collective experiences using a transcendental phenomenological research design. The study was guided by the theoretical frameworks of both social transmission theory (Dewey, 1916) and transformational learning theory (Mezirow, 2006) to better understand the relationship between student device use and peer and instructor collaboration and discourse within the military classroom. Data were collected directly from instructors who experienced the

student device use phenomenon in order to investigate the central research question and associated guiding questions (Creswell, 2013).

Central Research Question

How do military instructors describe their teaching experiences when incorporating student-owned devices into teaching/learning activities? This central question targeted instructors who were assigned to the institution after student BYODs were incorporated into the training programs and sought to understand how those instructors described their experience of the phenomenon (Moustakas, 1994).

Guiding Question One

How do participants describe their experiences with the quality of student-to-student collaboration in a classroom which incorporates student BYODs into teaching/learning activities? This study was grounded in Dewey's (1916) social transmission theory, which focuses on the importance of a collaborative learning environment. This guiding question sought to describe the instructors' perspectives regarding how student BYOD-use impacts student collaboration and learning.

Guiding Question Two

How do participants describe their experiences with the quality of instructor-to-student collaboration in a classroom which incorporates students' BYODs into teaching/learning activities? While remaining focused on Dewey's (1916) theory, the study sought to describe the instructors' experiences in establishing and sustaining a collaborative classroom environment through the use of student BYODs. Since the literature related to the topic of study focused, in part, on student social interaction (Lee, 2015), this question sought to isolate a description of the instructors' experience when leveraging student-owned devices.

Guiding Question Three

How do participants describe their experiences with the quality of student-to-student discourse in a classroom which incorporates students' BYODs into teaching/learning activities? Within this study I also sought to extend Dewey's theory by adding the second theoretical lens of transformational learning theory (Mezirow, 2006). Mezirow (2006) leveraged Dewey's theory by extending student classroom collaboration to include student active and critical discourse. This question sought to obtain a description of the instructors' perspectives regarding a potential correlation between student collaborative BYOD-use (Lee, 2015) and the quality of classroom student-student discourse.

Guiding Question Four

How do participants describe their experiences with the quality of instructor-to-student discourse in a classroom which incorporates students' BYODs into teaching/learning activities? Within the design of this study, Mezirow's (2006) work extends the premise of Dewey's (1916) theory by postulating that the classroom learning environment is enhanced by leveraging student-teacher collaboration as an opportunity to encourage student-to-teacher discourse within the classroom. This guiding question aimed at obtaining a description of instructors' experiences regarding the impact that student BYOD-use has had upon student-instructor classroom discourse.

Definitions

The terms and definitions listed below are grounded in literature focused on the topic of inquiry, the research design, or the theoretical framework of this study.

1. *BYOD (Bring Your Own Device)* - BYOD refers to an institutional policy which implements a technology model where students bring a personally-owned device to support their studies (Alberta Education, 2012).
2. *Social Transmission Theory* - The experience of the environment affects the learner, and the interaction which takes place between the learner and his environment should be based upon an active, dynamic, and developing experience (Dewey, 1916).
3. *Transformational Learning Theory* - Promotes active discourse as a component of classroom dialogue for students to better understand the meaning of an experience (Mezirow, 2006).
4. *DoD Enlisted Personnel* - Of, relating to, or being a member of a military rank below a commissioned officer or warrant officer ("Enlisted," 2011).
5. *DoD Cadet* - A student at a military school or in a military program training to be an officer ("Cadet," 2011).

Summary

The purpose of this transcendental phenomenological study was to describe the essence of the experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution located in the southeastern United States. While the Department of Defense continues to increase its network integrity to facilitate broader BYOD-use (Curran, 2014; "DoD Mobile Technologies," 2017), some training leaders have developed temporary alternate networks to enable students' BYOD access to curriculum and collaborative teaching-learning activities (Crane, 2017; Foster, 2016; McElroy, 2017; Roy et al., 2015). Other leaders are concerned about the risks which student distractions incur on academic performance (Carter et al., 2017a, 2017b), and therefore have decided to not introduce students'

access to their devices while in training. When considering network security and student distractions, the literature supports leadership decisions which both encourage and prohibit student BYOD-use in their classrooms.

Guiding this study were the social transmission theory (Dewey, 1916) and the transformational learning theory (Mezirow, 2006), which emphasize the teachers' role in establishing a collaborative atmosphere as the foundation to encouraging productive classroom discourse and learning efficacy. Few military classrooms are leveraging student-owned technologies, while others have elected to not introduce the devices into the teaching environment. This qualitative research study investigated the experiences of military instructors who leverage student BYODs in their teaching practices to establish and sustain a collaborative classroom environment.

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter provides an outline of the related literature and theoretical framework of student collaboration and discourse in adult learning classrooms. Employee and student BYOD practices in both the commercial sector and the adult learning classrooms are also reviewed, with a narrowed focus on the current practices and future employment of student BYOD-use within the DoD's recently designed continuum of learning initiative. The chapter concludes with a summary of the content and a statement regarding the gap in the literature which this study addressed.

Theoretical Framework

This study was grounded within the framework of two learning theories: social transmission theory (Dewey, 1916) and transformational learning theory (Mezirow, 2006). These theories were selected as the framework of this study since the literature related to the topic of inquiry (BYOD) is centered on the context of student social interaction (Lee, 2015). Dewey's theory served as the foundation of this study, since he articulated the importance of a collaborative learning environment. Additionally, Mezirow's work extends the premise of Dewey's theory by postulating that the classroom learning environment will be enhanced by leveraging student-teacher collaboration as an opportunity to encourage student-peer-teacher reflective and critical discourse. Within the context of this study, the social transmission theory served as the initial platform upon which the transformational learning theory was extended within a tri-service military enlisted classroom environment.

Dewey (1980) believed that the experience of the environment affects the learner, and the interaction which takes place between the learner and environment should be based upon an

active, dynamic, and developing experience. According to Dewey (1980), good education should have both a purpose for the individual student and a societal purpose. For Dewey, both the short and long-term educational experiences are valuable. Therefore, educators are responsible for providing experiences that are immediately valuable and which better enable the students to contribute to society. Educators should transfer their authority over the learning group to the group itself as soon as feasible. Dewey's theory is that experience arises from the interaction of two principles: continuity and interaction. Continuity refers to the belief that each experience a student has will influence his future. Interaction refers to the situational influence on one's experience. Dewey stated that that once a classroom experience occurs, educators can then organize subjects to leverage those (student) experiences. Increased student-BYOD use may allow for access to student social and collaboration tools, and therefore leverage the social transmission theory toward improved learning. In addition to Dewey's theory, this study also integrated Mezirow's (2006) transformational learning theory.

Mezirow (2006) promoted active discourse as a component of classroom dialogue for students to better understand the meaning of an experience. He believed that adult educators are partial to their subjects (Kitchenham, 2008), and therefore must take care to not indoctrinate students. Rather, the teacher's role is to create opportunities to foster voluntary participation in classroom discourse for the benefit of all learners (Mezirow, 2012). Teachers should model critical thought through engaging students to act upon their convictions, and to also assist classroom learners in assessing a topic from alternative perspectives, toward developing the student's practice of critical thought.

Passive alternatives to critical discourse are often encouraged in cultures where the communal goal is to sustain the authority of a regime, or the tradition of a religious practice,

where the population is docile and therefore limited in its reflective discourse (Mezirow, 1998). In contrast, transformation theory postures that the foundation of learning is grounded through the active process of communicating meaning by considering values, emotions, and context through the critical reflection of assumptions (Mezirow, 1998). When applied to this study, the Critical Reflection of Assumptions (CRA) is the process by which a student examines the ideas and received information for authenticity and reliability against their existing paradigms. CRA is a deliberate self-examination of taught concepts against pre-existing personal norms of culture, habit, and attitudes. The student seeks to discern not only the message, but also the construct of the message from the sender, through evidence, authenticity, arguments, and alternative meanings (Mezirow, 1978). "CRA may be a product of discourse, but it may also be the way an individual learner gains insight in dealing with a disorienting dilemma" (Mezirow, 1998, p. 195). Transformational learning is supported in the learning environment as the students reconcile meaning and insight from the information as presented, rather than passively accepting and responding in accordance with what they believe will please the teacher or (through social pressure) their peers.

In support of transformational learning theory and CRA, King and Kitchener (1994) indicated that learner's transition through seven developmental stages of learning assumptions from childhood to adulthood. The sixth and seventh developmental stages are focused on adult (vs. child) development and correlate with transformational theory because they describe the process of how adults validate meaning by contrasting ideas against alternative beliefs (Mezirow, 1998). According to King and Kitchener (1994), the developmental stages are as follows:

Stage 1. Single concrete category of knowing. Certain knowledge gained by direct personal observation and needs no justification.

Stage 2. Two concrete categories of knowledge. A person can know with certainty through direct observation or indirectly through an authority.

Stage 3. Several concrete categories of knowledge are interrelated. Knowledge is assumed to be either absolutely certain or temporarily uncertain. Justification is based on authorities' views or what feels right.

Stage 4. Knowledge is understood as a single abstraction. Knowledge is certain and knowledge claims are assumed to be idiosyncratic to the individual.

Stage 5. Two or more abstract concepts of knowledge can be related. Knowledge is seen as contextual and subjective. Beliefs are justified by using the rules of inquiry for the appropriate contexts.

Stage 6. Abstract concepts of knowledge can be related. Knowledge is actively constructed by comparing evidence and opinion on different sides of an issue; solutions are evaluated by personally endorsed criteria.

Stage 7. Abstract concepts of knowledge are understood as a system. The general principle is that knowledge is the outcome of the process of reasonable inquiry for constructing a well-informed understanding.

As mentioned earlier, stages six and seven are reached only as adults. These levels include the development of reflective judgment, which acknowledges that while an adult's understanding of their world is engrained, it was also purposefully constructed. The adult must be self-aware of their world-construct, and the context in which they created this construct, in order to achieve these levels of development (King & Kitchener, 1994). The mutually supportive framework of King and Kitchener's developmental stages and Mezirow's critical reflection of assumptions serves to operationalize transformational learning theory within the

context of this study. Much of the student educational BYOD-use related literature focuses on social interaction capability (Beland & Murphy, 2016; Kafyulilo, 2014; Lee, 2015; Lenhart, 2015; Roy et al., 2015; Thomas & O'Bannon, 2013). Considering this literature and the DoD's pursuit of critical thinking in military training (Raybourn, Schatz, Vogel-Walcutt, & Vierling, 2017), this study employed transformational learning theory to inform the role of student BOYD-use in military instructors' experiences related to productive student discourse.

Related Literature

Technology and lifestyle continue their integration within the lives of students and employees. This section of the literature review focuses upon how employees are using their personal devices to bridge the gap between their personal and professional lifestyles. As the thresholds continue to blur between these two sides of life, employees are adopting an integrated 24-hour availability posture when engaging the responsibilities of their jobs (Hayes & Kotwica 2013; Ladner, 2008). Employees are now meeting their employment tasks and projects at a time of day which they consider the most convenient and productive (Jaramillo et al., 2013; Yun, Kettinger, & Lee, 2012). This evolution of the workforce and the development of technology have inspired a wide band of behavioral and social science studies related to this topic. Since the literature on the topic of technology, lifestyle, commerce, and education is voluminous and beyond the scope of this study, this review of the literature will sample the breath of technology's integration into professional and personal lifestyles, then narrow its focus on the expansion of technology and personal devices within commercial and educational institutions, and finally narrow the aperture of inquiry to teachers' and students' use of personal devices in pursuit of supporting their teaching and learning experiences.

Technology in Commercial Institutions

Technology is interwoven with the personal and professional lives of society. As people navigate throughout their daily activities, they are rarely disconnected from a network—from the smart-phone alarm which wakes them in the morning, to their smart TV which brings them current events, to their tablet which brings them periodicals, their blue-toothed connectivity with their automobiles to guide them through traffic delays, their EZ-Pass links to highway toll booths, or their Common Access Card gateway to office parking, the company building, and network access. The rapid advances in hardware and software technology are continuously expanding (de Wet, Koekemoer, & Nel, 2016; Fiorenza, 2013). As of 2014, mobile phone use had risen to approximately 96% (French, Guo, & Shim, 2014), and mobile broadband had expanded 763% between 2007 and 2014 (de Wet et al., 2016). The availability and use of mobile hardware, software, and applications have become so prolific that society's connectedness has become omnipresent (de Wet et al., 2016). While the growth of hardware technology and its software application offerings have remained positively correlated (Shim, Mittleman, Welke, French, & Guo, 2013), the device which integrates the two has become a personal accessory, rarely out of its owner's reach.

The growing practice known as BYOD refers to a model in commerce where employers allow employees to use their personal devices to accomplish work tasks or projects (Keyes, 2013; Smith & Forman, 2014; Vickerman, 2013; Waterfill & Dilworth, 2014), and in education where learning institutions allow or encourage students to leverage their personal technology to support their objectives (Alberta Education, 2012). The work-related BYOD phenomenon continues to blur the previous demarcation lines of personal and professional time, effort, "business," information, and even privacy (Al Ayubi et al., 2016). Not long ago employees

would arrive at their company workspace, log on to a network via a business-owned desktop, and execute their responsibilities through company hardware that was physically partitioned from their personal devices. Network controls were limited to the desktops, and access was restricted to hardware physically connected to a company's network. The employee BYOD construct, when employed at the place of business, fissures the personal and professional network partitions and therefore integrates the lines of social and business communication (Waterfill & Dilworth, 2014). Considering this integration, the needs for dual (personal and professional) hardware also became blurred, which inspired benefits of BYOD to both the organization and its employees.

Employee BYODs. Organizations that permit or encourage employee BYOD practices experience the financial savings of not having to purchase defined employee-issued hardware. In order to retain some degree of hardware standards required to support organizational applications, many companies elect to contribute to the purchase of an employee-owned device (Donovan, 2014a; Weeger, Wang, & Gewald, 2016). Organization-provided applications also experience higher levels of use and efficacy when accessed by the more familiar employee-owned device (Weldon, 2013). Many organizations include software which tracks and records employee-labor hours, and logs official communication between the employer and the employee (Weldon, 2014), which supports partitioning the BYOD usage between professional and social discourse to enhance the privacy of the individual and the proprietary information of the organization (Vorakulpipat, Sirapaisan, Rattanalerdnusorn, & Savangsuk, 2017). The simultaneous interaction and compartmentalization of public and private information has triggered challenges for organizations that support the co-mingling of complex information exchanges on a single personal device. While employers may seek to leverage employees'

familiarity with their personal devices to enhance productivity, the use of BYOD is also accompanied by security risks to their organizations.

Risks with employee BYODs. In 1986, the Computer Fraud and Abuse Act (CFAA, 2011) prohibited the unauthorized access of computer data. The CFAA has been cited by employers in lawsuits against employees who illegally obtained closely held company information. Organizations whose networks permit access and the exchange of data also bear the responsibility of clearly articulating the BYOD-user responsibilities regarding the retrieval and protection of organizational information (Vorakulpipat et al., 2017). The opposite is also true where companies have a fiduciary responsibility to protect employees' personal information gained through the gateway of their personal devices (CFAA, 2011). Sauer (2014) captured a snapshot of the proliferation of BYOD-use at work by describing a poll in which 80% of respondents indicated that they used their personal devices at work while 66% of those same respondents also reported that their employers had not yet implemented policies governing the use of those same devices. The absence of an organizational BYOD-use policy exposes an organization to the additional risk associated with data loss or misuse. Once thought to be the sole responsibility of the institutional Informational Technology domain, the additional exposure which accompanies BYOD traverses all stakeholders (Olalere, Abdullah, Mahmod, & Abdullah, 2015; Smither, 2015). Employees who lose their device or unexpectedly separate from the organization create locus of control issues for the company, since it retains its connectivity and identity with the device (Ackerman, 2013). In the event the device is engaged by a customer contact through the existing phone number, business relationships may assume risk. In contrast to company-owned laptops that are usually constrained by use-limiters (Leavitt, 2013), personal devices are delimited and therefore reliant upon owner-initiated (vs. organizationally-pushed)

software updates, which increases the exposure to Secure Socket Layer software risks (Castro et al., 2013; Ghosh et al., 2013). As the emergence of the employee-BYOD phenomenon continues, organizations strive to keep pace by producing effective use-policies with the goal of maximizing efficacy and mitigating risk. Concurrent with the dual challenge of BYOD-use and policy development is the increased expectation of employees for additional flexibility and freedom to perform their duties through the use of BYODs.

Managing staff through BYODs. Organizations are developing and using employee recruiting and retention strategies that align with the technology expectations of both their staff and job applicants (Köffer, Ortbach, Junglas, Niehaves, & Harris, 2015; Weeger et al., 2016). These expectations are most pronounced within the generation of recent graduates, commonly defined as the millennials (Much et al., 2014; Swanson & Walker, 2015). As mentioned, the proliferation of technology has yielded a global workforce that increasingly expects to use their own devices, primarily due to familiarity, when working on professional tasks (Ackerman, 2013; Yevseyeva et al., 2015). Some organizations have also used their progressive BYOD policies as advertising points when marketing their company to potential employee talent pools (Ríos-Aguilar & Lloréns-Montes, 2015). Job applicants have high expectations for employing their creative and collaborative agility within the practice of their profession (Rose, 2013; Waterfill & Dilworth, 2014; Weeger et al., 2016). In addition to attracting talent to their organizations, companies are also using employee devices as pathways to workforce retention and management, especially in the growing remote labor force (Jaramillo et al., 2013; Ríos-Aguilar & Lloréns-Montes, 2015). The remote labor force often carries with it a “proof of presence” requirement which enables leaders to sustain an employee heterogeneous connected presence to stabilize and focus their talent pool (Campbell, Ganco, Franco, & Agarwal, 2012; Kumar &

Pandya, 2012; Nayak, Swamy, & Ramaswamy, 2013; Zandbergen & Barbeau, 2011). To remain competitive, organizations seek to harness the exponential power of collaboration between remote employees across different time zones. Toward this goal, several mobile information systems have been developed to support employee accountability and interoperability (Campbell et al., 2012; Fiorenza, 2013; Li et al., 2014). In addition to remote workforce management, employee retention is also sustained through an agile, accessible, and robust labor-management relations function.

Despite the advantages of employee-leveraged technology within the workforce (e.g., flexibility, creativity, collaboration, etc.), employee disputes and misunderstandings can occur (Katsh & Rifkin, 2001; Rule, 2015; Shim et al., 2013). Since a workforce can be geographically separated, organizing in-person meetings between complainants is not always responsive to the timelines and needs of the employees or their organizations. To mitigate these concerns, on-line dispute resolution practices have been deployed through video teleconferencing by hosting virtual visitors to on-line ombudsmen's offices to facilitate reconciliation between employees and management (Ríos-Aguilar & Lloréns-Montes, 2015; Rule & Sen, 2015). These virtual employee-relations practices have been found to correlate with the cultural on-line work expectations of employee and organizational constituents (Fernandez & Masson, 2014; Katsh & Rifkin, 2001), however, this medium is not without its limitations. In the case where the complainants are separated by international boundaries, dispute agreements may not be enforceable (Fernandez & Masson, 2014). Additionally, while the on-line participants may be technologically savvy, there remain occasions where employee collaboration traverses geo-separation and cultural communication norms and may unintentionally contribute to conflict (Rule & Sen, 2015). Similar to the dynamics of employee management, the authors offer no

single model, medium, or approach to support workplace conflict resolution. The literature indicates that the characteristics of accessibility, accountability, cost efficiency, and equitability among the workforce should be the objective when considering the selection of on-line or live resources to best support employee relationships where BYOD is integrated into the institutional culture (Bygstad, 2017; de las Cuevas et al., 2015; Katsh & Rifkin, 2001; Rule, 2015; Yuan, Archer, Connelly, & Zheng, 2010).

Technology in Higher Education

The factors inspiring the use of personal devices in both commerce and higher education share the common pursuit of efficacy. Within the commercial sector, the use of devices is motivated by the efficacy of production and costs, whereas in education the technology offers opportunities for learning efficacy (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). The devices enable students to schedule their course load, take comprehensive notes, complete research more efficiently through instant internet access, and complete assignments in a fraction of the time it took in the paper-based education age. The proliferation of mobile technologies and the potentially positive impact upon learning has encouraged higher education leaders to integrate student devices into their curriculum (Parker, Lenhart, & Moore, 2011; Thomas, Faure, & Orthober, 2011). Studies report that approximately half of students surveyed in 2011 regularly used devices (smartphones, laptops, tablets, etc.) for some portion of their coursework, and more recent research indicates that up to 79% of students are using devices in classrooms (Patterson & Patterson, 2017). Reviewing the literature through the lens of student BYOD-use in higher education reveals themes of millennial student demographics, mobile learning and social media, student multi-tasking and distractions, and impacts upon academic performance.

Millennials do not compartmentalize their academic, social, or personal lives. They prefer to treat these domains as a continuum, which is reinforced by the technology's capability to support students' expectation of instant communication. Since the role of technology has been continuous in their lives, digital natives have developed a strong sense of expectation for immediate results (Jackson, 2015). iGeneration students expect their devices to produce rapid internet searches and to keep them connected with friends through social media (Figueras-Maz, Masanet, & Ferrés, 2017). Considering the rapid evolution of the devices, educators have been encouraged to realign teaching and learning strategies to correlate with their students' desire to integrate these tools into their academic lives. As a result, some researchers are concerned that while students may be confident in using the technologies to communicate, they may lack the information literacy to take full advantage of mobile learning (Gaudreau, Miranda, & Gareau, 2014; Ravizza et al., 2014).

Mobile learning serves as a medium for learning by way of smartphones, tablet computers, and laptops. Recent hardware and software advances have rendered the devices more flexible, portable, and robust, as most devices possess the capabilities for data, audio, and video recording, streaming, and transmission. When armed with faster access speeds, students claim to experience better collaboration with their peers and teachers while developing a personalized approach to their learning objectives (Bell & Federman, 2013; Cochrane & Bateman, 2010). These advantages also instigate educators' concerns about the pitfalls for students who do not use their devices productively (Hew & Cheung, 2013). While student devices may serve as powerful enablers to academic achievement, they can also distract students, compromise meaningful learning, and handicap academic performance (Carter et al., 2017b). Study results indicate that when students' classroom BYOD-use is unrestricted, they engage in non-academic

activities such as posting on social media, playing games, or checking their e-mail (Dietz & Henrich, 2014). These distractive behaviors are negatively correlated with academic performance (Aagaard, 2015; Sana et al., 2013). Additionally, non-users who are distracted by BYOD-users also receive lower grades in their courses, primarily due to the increased cognitive load associated with multitasking behaviors (Salvucci & Taatgen, 2001; Srivastava, 2013). While some students claim the ability to self-manage multitasking by limiting device use to only when working on easier subjects, researchers did not share the same optimism in those abilities.

Researchers suggest that when unrestricted student BYOD-use is permitted, the cumulative impact of the volume and types of information for students to process generates considerable risk of distraction (Gaudreau et al., 2014; Junco & Cotten, 2012; Ravizza et al., 2014; Risko et al., 2013; Sana et al., 2013; Wood et al., 2012). On the other hand, educator proponents of student BYODs view this trend as an opportunity to align with emerging device capabilities by designing lessons which enhance student engagement in the classroom (Anderson, Anderson, Vandegrift, Wolfman, & Yasuhara, 2003; Caron & Gely, 2004; Foley, 2014; Samson, 2010). The common theme regarding student device use in higher education is that the technology has the potential to enhance or detract from learning, dependent upon how effectively the teacher deliberately aligns the technology with their digital native students' learning styles.

Digital native students. "Digital Immigrant" refers to people born prior to the proliferation of personal digital technology (Bennett, Maton, & Kervin, 2008; Firat, 2013; Kennedy, Dalgarno, et al., 2008). Students within this demographic grew up in a paper-driven society, and to remain relevant, were forced to transition to the digital domain. "Digital Native" describes those who have been immersed in technology since they were born (Jackson, 2015;

Kennedy, Judd, Churchward, Gray, & Krause, 2008; Palfrey & Gasser, 2013). Natives born after 1980 are also referred to as "Millennials" since they became legal adults close to the year 2000 (Bennett & Maton, 2010; Helsper & Eynon, 2010; Oblinger & Oblinger, 2005). Millennials born after 1995 are sub-categorized as the "Net Generation," since the internet has always been a presence in their lives (Jones & Healing, 2010; Jones, Ramanau, Cross, & Healing, 2010; Tapscott, 1998). Following the launch of the iPhone in 2007 and the iPad in 2010, the "iGeneration" (i.e., iGen) label added further granularity to the Net Generation through their continuous handheld internet availability (Figueras-Maz et al., 2017; Rosen, 2010; Small & Vorgan, 2008), with up to 75% of teens owning an iPhone in more recent years (Figueras-Maz et al., 2017; Thompson, 2015). The common traits of the Millennials, the Net Generation, and the iGeneration are that they crave increased access speeds, prefer pictures over text, are impatient, have short attention spans, and have well-developed habits of linear thinking (Figueras-Maz et al., 2017; Itō, 2010; Ng, 2012; Prensky, 2001; Rosen, 2010; Tapscott, 2009). Additionally, digital natives also prefer multi-tasking such as texting while studying, checking e-mail while doing homework, or updating social media while listening to a classroom lecture (Akçayır, Akçayır, & Dündar, 2016; Calderwood, Green, Joy-Gaba, & Moloney, 2016; Figueras-Maz et al., 2017; Rainie, 2006). In response to these preferences, some educational leaders have modified their teaching and learning strategies to better correlate with the perceived advances in students' information literacy (Šorgo, Bartol, Dolničar, & Boh Podgornik, 2017).

Higher education students use their smartphones, tablets, and laptops to bridge the continuum across their personal, social, and academic domains. To mitigate communication barriers between students and the institution, some educators are striving to leverage student devices by integrating the technology into teaching activities (Figueras-Maz et al., 2017;

Grigoryan & Babayan, 2015). While these teachers are optimistic about their students' natural ability to effectively incorporate the devices into their studies, others see risk to meaningful learning when students are permitted unrestricted student BYOD-use (Bauerlein, 2008; Nguyen, Barton, & Nguyen, 2015; Sana et al., 2013). As mentioned, the literature indicates both positive and negative correlations between device use and academic performance yet commonly concludes that while digital natives are confident with the internet, texting, and e-mailing, they may not be information literate (Šorgo et al., 2017). Digital learners may forge through their research assignments assuming that all retrieved data contain valid information through a misunderstanding of their search engine's functionality (Emanuel, 2013; Guo, Dobson, & Petrina, 2008; Kennedy & Judd, 2011). In these cases, millennials can forgo a critical review of the research and use unreliable data in their pursuits (Emanuel, 2013; Hignite, Margavio, & Margavio, 2009; Jackson, 2015). Researchers and educators may not agree on the risks associated with portable devices and information literacy, yet they do concur that including information literacy in educational programs will better support millennial students' learning efficacy (Calderwood et al., 2016; Emanuel, 2013; Figueras-Maz et al., 2017; Hignite et al., 2009; Langan et al., 2016; Ng, 2012; Thompson, 2013).

Mobile learning and social media. Mobile learning (m-learning) refers to the construct of teaching and learning as mediated by devices such as tablets, smartphones, laptops, and other portable devices in higher education (Castillo-Manzano et al., 2017). The literature indicates that there has been sustained m-learning growth in higher education since 2007, with the most commonly used student BYOD technologies as laptops, tablets, and smartphones (Shadiev, Hwang, & Huang, 2017). Additionally, the 2010 release of the Apple iPad also triggered widespread use among students who preferred a wider screen and broader selection of

applications similar to desk-tops. Teachers and institutions quickly adapted to the iPad's capabilities for student administration, curriculum distribution, and submission of assignments and feedback (Nguyen et al., 2015). Device attributes include portability, flexible applications, removal of time and space limitations on education, and their continuously expanding capabilities. These features have inspired some teachers to exploit the technology with the goal of enhancing students' collaboration with peers and instructors, while leveraging additional capabilities for ad-hoc research and data collection (Foley, 2014; Song, 2014).

Institutional investments in technology have yielded a teaching environment that is rich in tools, yet inconsistent in implementing lesson delivery which fully leverages the technology to support lesson objectives (Alrasheedi & Capretz, 2015; Chen & Yan, 2016; Castillo-Manzano et al., 2017). To encourage educators in the use of classroom technology, software developers have designed applications which facilitate student engagement by way of note-taking, PowerPoint slide drawings, recording lectures, providing feedback, and presenting questions during lectures (Grigoryan & Babayan, 2015; Oblinger & Oblinger, 2005; Zhu, 2006). When teachers deliberately integrate student devices into their curriculum, students report that their learning is enhanced through opportunities for interaction and collaboration (Gikas & Grant, 2013; Mifsud, 2014). The literature also indicates that these preferences are positively correlated with the use of social media to facilitate student and teacher interaction (Alrasheedi & Capretz, 2015; Langan et al., 2016; Piotrowski, 2015; Thompson, 2013).

Digital natives use social media applications as their primary mode of communication. In lieu of physically gathering together, the iGen students commonly congregate by way of digital social environments to collect information on current events, to stay in touch with friends, and to do research. Higher education has responded to these realities by developing learning

communities to harness the power of these social connections toward better supporting students' individual learning needs and encouraging academic success (Davis, Deil-Amen, Rios-Aguilar, & González Canché, 2015; Hamid, Waycott, Kurnia & Chang, 2015; Kooy, 2016; Tsai, Shen, & Chiang, 2013). While the selection of social applications continues to widen (e.g., Yammer, Instagram, Yik Yak, Whats App, Snapchat, etc.), the two prominent forms of social media are Twitter and Facebook (Arteaga Sánchez, Cortijo, & Javed, 2014; Milošević, Živković, Arsić, & Manasijević, 2015).

Twitter is a popular microblogging media with millions of users who send and receive messages across web accounts and other applications. Capacity for on-line "tweeting" is 140-200 characters and includes image attachment capabilities (Davis et al., 2015; Grosseck & Holotesch, 2008; Knowlton & Nygard, 2016).

Facebook was launched in 2004 as a social media service allowing participants to construct a profile for use within a bounded system (Ainin, Naqshbandi, Moghavvemi, & Jaafar, 2015). The profiles are connected with other user profiles for the purpose of exchanging information, images, songs, personal history, professional demographics, and other interests. Students use the application to communicate with peers and teachers, collaborate on coursework, and for resource sharing (Milošević et al., 2015). In qualitative studies of student perceptions of the academic use of Facebook, participants believe that there is a positive relationship between academic performance and Facebook use (Ainin et al., 2015), yet quantitative studies indicate that Facebook use is negatively predictive of student grades (Junco, 2015). In the latter studies, a detailed examination of higher education experience indicates that the negative correlation between Facebook use and grade point averages was more significant for lower classmen than for college seniors (Junco, 2015; Kooy, 2016; Piotrowski, 2015; Tsai et al., 2013). While

Facebook has sustained its popularity with students, teachers have not yet integrated the application into their classrooms. Contrary to student preferences, many instructors continue to employ traditional styles of teacher-centered selection and delivery of curriculum, which has created a gap between students' preferred learning styles and the educators' preferred teaching styles (Burden & Kearney, 2016; Cochrane & Antonczak, 2014; Crompton & Burke, 2015; Rushby, 2012).

Mobile learning and social media are woven together through the proliferation of laptop, smartphone, and tablet technologies. The portability of these devices and their connectivity with education and social media sources have rendered them popular tools for higher education students (Figueras-Maz et al., 2017; Rosen, 2010; Thompson, 2013). The millennials and the iGeneration strongly prefer integrating devices into their lifestyles, which burdens institutions to align their course design and delivery with student preferences (Foley, 2014; Mifsud, 2014). Research supports teachers' beliefs that students are individual learners with personal learning preferences which center on the use of their devices (Burden & Kearney, 2016; Castillo-Manzano et al., 2017; Crompton & Burke, 2015; Gikas & Grant, 2013). Leveraging m-learning and social media aligns with digital natives' preferences for presenting information and encouraging peer interaction. Educators often assume that students understand the importance of properly leveraging technologies for deep learning experiences and that they are equipped to prevent the devices from becoming a hindrance to the learning environment (Aagaard, 2015; Risko et al., 2013; Sana et al., 2013). The next section of this literature review synthesizes the common challenges which students encounter when they fuse their personal devices with their educational pursuits.

Student multi-tasking and distractions. The use of personal devices in the teaching and learning environment offers students many advantages. Instructors often make available read-ahead outlines and slides prior to the class to support student preparation and collaboration. Additionally, most millennial students have the ability to type faster than they can write, making in-class note taking more efficient and storage of the notes more effective following the class (Katarey & Francis, 2014; Nguyen et al., 2015). Retained notes, annotated slides, and other class information can be organized, saved, and shared indefinitely. Investigators have found that when leveraged appropriately, the use of laptops can increase opportunities for students to remain engaged with teachers and peers, as compared to scribbling fast enough to keep pace with the lecture (Fried, 2008; Katarey & Francis, 2014). In contrast, other researchers suggest that taking notes on a keyboard is less effective than hand-recorded notes. They counter that when students take class notes on a keyboard, their learning and retention is shallower than if they had employed the more immersive practice of handwriting the notes (Gaudreau et al., 2014). Participants in studies which compare learning efficacy between typing and handwriting performed worse on comprehension tests when they used a keyboard to record notes (Katarey & Francis, 2014; Mueller & Oppenheimer, 2014). While both handwritten and typed note-taking share the common benefit of higher engagement in learning than if notes were not taken, the students who typed their notes were more apt to transcribe the instructor's presentation than the handwritten notetakers who reframed the lecture in their own words while summarizing the information (Mueller & Oppenheimer, 2014). Despite the comprehension advantages of taking notes by hand, students still prefer to use their devices to record notes and to complete other tasks during class (Synnott, 2015).

Accompanying student preferences for using devices is the broadening body of research concerning the pitfall of distractions associated with student multitasking. Multitasking is defined as "divided attention and non-sequential task switching for ill-defined tasks as they are performed in learning situations" (Junco & Cotten, 2012, p. 506). Posner (1990) describes two types of multi-tasking: divided attention and rapid attention switching. Divided attention refers to simultaneously processing more than one stimulus, resulting in fragmented compartments of information (Posner, 1990). Rapid attention switching describes when students are engaged by multiple stimuli yet process only one stimulus at a time, and therefore lose information during the transition between stimuli (Posner, 1990). Studies which focus on how students employ their devices in classrooms indicate that these technologies are often used for multi-tasking of non-subject activities, which in-turn leads to decreased academic performance (Bowman, Levine, Waite, & Gendron, 2010; Fried, 2008; Gaudreau et al., 2014; Hembrooke & Gay, 2003; Junco & Cotten, 2012; Ravizza et al., 2014; Risko et al., 2013; Sana et al., 2013; Wood et al., 2012). The amount of attention which students delegate to each mental activity is determined by an executive control system, which allocates a proportional amount of cognitive resources to each activity (Fernandez-Duque & Johnson, 2002). When the demand, through multi-tasking or distractions, for delegated mental resources exceeds those available, the cognitive overloading will compromise academic performance (Sweller, Ayres, & Kalyuga, 2011). Studies indicate that it takes longer for students to read a text while multitasking and that they will score lower on comprehension assessments of that text (Bowman et al., 2010; Fox, Rosen, & Crawford, 2009; Lee, Lin, & Robertson, 2012; Risko et al., 2013; Sana et al., 2013; Srivastava, 2013; Wood et al., 2012; Zhang & Zhang, 2012).

Despite the academic degradation associated with multitasking, qualitative studies indicate that students nonetheless prefer to use their devices in the teaching and learning environment (Junco & Cotten, 2012; Synnott, 2015), since they believe that the research does not accurately reflect their ability to effectively multitask (Aagaard, 2015; Ravizza et al., 2014). Students report that when the lesson delivery does not meet their expectations, they find it difficult to summon the focus for meaningful learning (Andersson, Hatakka, Gronlund, & Wiklund, 2014), and therefore seek more interesting alternatives which are immediately available on their devices. Student multitasking includes visiting social media, checking e-mail, playing games and reviewing websites unrelated to the subject, all of which impair school grades (Dietz & Henrich, 2014; Ellis, Daniels, & Jauregui, 2010; Fox et al., 2009; Grosseck & Holotesch, 2008). When the devices are visible to other students in the vicinity, the risk of secondary distractions is also extended to these bystanders (Sana et al., 2013; Synnott, 2015). Considering that the use of devices during lectures has increased from 64% in 2007 (Fried, 2008) to 79% in 2016 (Carter et al., 2017b), so too has the risk of primary and secondary distractions also increased (Aagaard, 2015), resulting in diminished academic performance for both users and non-user bystanders.

Academic performance and classroom interventions. Students' use of devices in classrooms has inspired both positive and negative effects upon academic performance (Carter et al., 2017a; Gaudreau et al., 2014, Katarey & Francis, 2014; Song, 2014). With immediate access to web searches, social networking, library search engines, blogs, and discussion boards, along with the ability to record, review, and edit audio and visual information, BYOD technology has equipped students with powerful portable information tools not available to previous generations. In response to these increasing capabilities, many educators seek to incorporate the devices into

their classroom teaching practices with the goal of enhancing student collaboration and discourse (Anderson et al., 2003; Caron & Gely, 2004, Foley, 2014; Samson, 2010). When student devices are deliberately planned and implemented into teaching and learning activities, studies indicate that they have a positive impact upon academic performance (Bell & Federman, 2013; Gikas & Grant, 2013; Tamim et al., 2011). Educators who enhance the learning environment by integrating internet inquiries, fact-checking, and parallel information searches find that student participation is higher than in traditional classrooms which do not employ the technology (Anderson et al., 2003; Caron & Gely, 2004; Samson, 2010). Software developers have responded to this market by designing applications which organize lesson presentation and student interaction to support higher levels of student attentiveness and discourse. Classroom software applications such as Lecture Tools, Poll Everywhere, Google Moderator, Live Question Tool, and CT Tools employ laptops, smartphones, tablets, and other devices to solicit student feedback and to adjust classroom lectures to sustain student participation (Gulek & Demirtas, 2005; Hew & Cheung, 2013; Jones & Healing, 2010; Nguyen et al., 2015). Other student device benefits include the reduced costs of borrowing or renting texts (as compared to hard copy editions), and the ability to retrieve, store, and annotate articles, all of which support student learning (Anderson et al., 2003; Grigoryan & Babayan, 2015; Patterson & Patterson, 2017). The counterpoint to these benefits is that typing on personal devices also carries the risk of students misusing the technology.

As mentioned in studies where use of devices was monitored, off-task activities such as checking social media, writing e-mails, and texting were all negatively correlated with academic performance (Grace-Martin & Gay, 2001; Kraushaar & Novak, 2010). Patterson and Patterson (2017) found that the academic cost of off-topic device activities ranged from.14 to .37 negative

grade points on the Grade Point Average (GPA) scale, with the most significant impact on male and low-performing students (Scott-Clayton, 2011). Other studies focusing on institutional policies requiring students to bring a laptop to class contributed to a reduction of .04 to .05 in GPAs, while banning student devices stimulated an increase in .05 to .09 in GPAs (Hembrooke & Gay, 2003; Patterson & Patterson, 2017). When considering the impact to bystanders who do not use their devices in the classroom, students within proximity of users also experienced a negative influence on their GPAs (Dietz & Henrich, 2014; Sana et al., 2013). Even when students are able to avoid the distractions of off-topic use of the devices, critics of student devices nonetheless contend that typing shifts focus away from the critical thought process of summarizing and synthesizing information. In these cases, learners are relegated to the role of information recorders and data processers, in lieu of remaining engaged the learning process through peer collaboration and classroom discourse (Gaudreau et al., 2014; Gross, 2014; Zhang, 2015). When faced with conflicting academic outcomes associated with student device use, educators and institutions are increasingly banning student BYODs in classrooms.

In recent years, the banning of student BYODs, including laptops, smartphones, and tablets, has gained favor (Beland & Murphy, 2016; Carter et al., 2017b; Gross, 2014). Banning mobile phones in United Kingdom schools has inspired an average .07 standard deviation increase on exams, with low-achieving students experiencing the most significant change within the study's participants (Beland & Murphy, 2016). Other parallel study results echoed that unrestricted student BYOD-use in classrooms was accompanied by detrimental academic results to both male and low-performing students, leading researchers and some educators to conclude that banning the devices is a logical intervention to support this population (Aguilar-Roca, Williams, & O'Dowd, 2012). Counter to banning student BYODs, other researchers suggest that

deliberate planning interventions for student technology renders positive correlation between device use and students' academic performance. Deliberate planning includes establishing clear instructional goals for use of the technology prior to delivering the lesson. Use of classroom software applications enables teachers and students to take advantage of the educational capabilities of the devices by enrichening the course material, facilitating collaborative pathways with peers, and increasing student learning (Barak, Lipson, & Lerman, 2006; Gulek & Demirtas, 2005; Hew & Cheung, 2013). In summary, the literature on students' BYOD-use in higher education indicates that student-owned technology carries both the benefits and the pitfalls similar to those of other instructional devices.

Technology in Military Training

Each of the military services' training policies have migrated simultaneously toward and away from students' use of BYOD (Edwards-Stewart et al., 2016; Foster, 2016; Lendon, 2016; Roy et al., 2015) as determined by the prerogatives of the commander of a specific training institution (Suit et al., 2015; U.S. Air Force, 2003; U.S. Army, 2018; U.S. Navy, 2010). This policy of localized training decisions yields education and training programs which are often incongruent with follow-on training across the spectrum of an occupational specialty (Carter, 2015). The DoD's recent implementation of an education and training transformation across all of the uniformed services will inform and impact these training technology decisions.

The DoD training transformation began in 2014 when the Secretary of Defense (SecDef) designed a vision for the future of military education and training, titled as the Third Offset Strategy (Hagel, 2014). The strategy focused on the sustainment of the U.S. forces through the identification of new technologies and systems to sustain military dominance. In 2015, the SecDef built upon the earlier technology and systems framework by announcing the Force of the

Future initiative (Carter, 2015). The goal of this initiative was a reform of the DoD's enterprise-wide talent management system: recruiting, compensation, development, and retirement (Carter, 2015). Prior to these initiatives, the individual services executed their training doctrine and policies through varying degrees of compartmentalization across their branches (Schatz, Fautua, Stodd, & Reitz, 2015). Going forward, both training doctrine and execution will be organized more by horizontal function (force development) versus vertical command chains (operational forces) to varying degrees, as dictated by the needs of each service (Carter, 2015; Fautua, Schatz, Boring, Reitz, & Reist, 2017). To that end, each branch of service has published a document capturing its vision of the future state of education and training.

Within the U.S. Army, the document which articulates its education and training transformation is titled *The U.S. Army Learning Concept for Training and Education 2020–2040* (U.S. Army, 2017). This document captures the vision of a learning organization whose goal is to encourage the development of adaptable Army soldiers and civilian employees that are equipped with the competencies to generate and sustain teams who are capable of prosecuting the mission (U.S. Army, 2017). The Army training pamphlet included not only a revised education and training development and delivery construct, but also broadened the roles of force development into the broader spectrum of career competencies across joint forces employment. The U.S. Navy used a similar approach in designing its way forward.

In 2017, the U.S. Navy published its vision for talent development in support of the DoD's Force of the Future and named it *The Sailor 2025 Program* (Navy Personnel Command, 2017). Similar to the US Army document, the sailor program considers its human capital management and development across the next generation of the naval workforce. The Navy vision contains 43 initiatives which are categorized into three areas of focus: Personnel System

Modernization; Ready, Relevant Learning; and Enriched Culture. This vision document also describes the role of learning as a career-wide endeavor with the Ready, Relevant Learning category seeking to generate sailors with right training, at the right time, in the right way (Navy Personnel Command, 2017). While the Sailor 2025 program includes a comprehensive set of initiatives to execute its vision, the U.S. Marine Corps (2016a) Operating Concept built upon three existing documents to align with the SecDef initiative: the USMC *Expeditionary Force 21* (U.S. Marine Corps, 2014), *Marine Corps Service Strategy 2016* (U.S. Marine Corps, 2016b), and the *Force Development Strategic Plan* (U.S. Marine Corps, 2015):

The USMC operating concept consists of three guiding documents which leverage technology and build partnerships to train marines to think critically and act decisively within chaotic and adverse environments (U.S. Marine Corps, 2016a). The U.S. Air Force (USAF) used a strategy similar to the USMC by building upon its existing *Strategic Master Plan* (U.S. Air Force, 2015) and adding The Human Capital Annex, which outlines specific courses of action that the Air Force will use to meet the SecDef goals. Similar to the USMC and USN programs and in correlation with the SecDef vision for the future fighting force, the USAF seeks to leverage technology and revise current training processes to deliver lifelong education and training specifically to the individual needs of airmen (U.S. Air Force, 2015). More recently, in support of executing the Air Force Strategic Master Plan (U.S. Air Force, 2015), the commander of the USAF Air Education and Training Command indicated that the Air Force must redesign its Continuum of Learning from an episodic and production-centered approach, to an individual learner-centered model (Roberson, 2017).

Within these documents, each service articulates its human talent development requirements to ensure its sustainment as a world-class fighting force across the next generation

of soldiers, sailors, airmen, and marines. A comparative review of the services vision reveals several common themes for the future of military training (Raybourn et al., 2017). Among these common themes, and related to the employment of training technology and student-owned devices, is the goal of delivering more learning at the point of need (Mathews, 2013; Raybourn et al., 2017).

Point-of-need military training. The military services talent development documents possess several common themes, one of which is referred to as point-of-need training. Point-of-need training refers to the concept of "breaking time-based, linear learning opportunities into more modular content that can be delivered on-demand" (Raybourn et al., 2017, p. 10). The point-of-need training design involves dissecting current time-based, episodic training events into need-based just-in-time training modules, which are delivered as mission or learning requirements dictate (Roberson, 2017). By chunking learning objectives using digital devices, service members can leverage the right training at the right time, as needed or desired to best support their knowledge or performance requirements (Folsom-Kovarik & Raybourn, 2016; Navy Personnel Command, 2017). Present day military members are very comfortable with technology. They are accustomed to and proficient in using various forms of social media, blogs, podcasts, and videos to facilitate collaboration, problem solving, information sharing, emotional support, etc. (Maltby & Thornham, 2016). Army policy also encourages its leaders to leverage the use of technology for soldiers' social interaction as part of the foundation of their digital learning environment (U.S. Army, 2017). Service members' use of various types of hardware such as laptops, tablets, smartphones, and wearable devices make them perfect candidates to leverage faster, cheaper, and connected technology. No longer is technology-embedded training restricted to brick and mortar computer labs or training centers. Soldiers can

now access training materials in the classroom, laboratory, on the job, or in the field (Wyche, 2014). Military members' technical fluency and their expectations of connected environments have inspired an opportunity for the services to modify their training development and delivery models through the use of personal devices (Wyche, 2014).

The Army has invested in the development of a wide range of mobile applications, which are available for download by service members. The applications make available publications, simulations of tasks and operations for initial or refresher training, medical procedures review, mental health support, and mobility and deployment training tasks (Bush & Wheeler, 2015; Shore et al., 2014; Tadjdeh, 2014). Most of the Army applications were developed and formatted so that they could be used by soldiers without having to rely upon connectivity should the need arise (Wyche, 2014). As the review of the literature narrows from student BYOD opportunities to actual BYOD-use, the availability of the literature which explores impacts upon student collaboration and discourse narrows significantly.

Within each of the service branches, the literature captures compartmentalized examples of excellence regarding the use of personal devices, yet when compared to the prolific exploitation of the technologies within the civilian industry and education domain, relatively little is known about the enterprise-wide use of personal technology within the military services (Bush & Wheeler, 2015). The military services' training transformation initiative articulates an overarching vision with ambitious goals for the interoperability of technology within continuum's of learning, yet specific applications of personal devices in support of the DoD's Force of the Future (Carter, 2015) are only sporadically documented. In other cases, local military school leaders, through their concerns about the negative effect of student distractions, have not introduced student access to their devices while in training (Carter et al., 2017a, 2017b).

In 2012, McGhee accurately predicted, “The speed at which industry is able to develop and manufacture increasingly powerful devices makes it difficult to keep up with the educational benefits of the latest mobile capabilities” (p. 14). Additionally, the current proliferation of personal devices instigates challenges similar to those in the commercial sector, specifically, network security (Erwin, 2016; Lange, 2016). When considering the importance of enterprise network security, military and government educational leaders have been encouraging their institutions to continue working on the development of mobile training solutions using the non-secure side of network management (Donovan, 2014b; Preimesberger, 2014; Tadjdeh, 2014). One early technical training initiative was launched in response to the Army Learning Model and Experiential Learning Model (U.S. Army, 2011), which utilized a satellite operator course at the U.S. Army’s Signal Center of Excellence’s LandWarNet School (Mathews, 2013).

While attending the satellite operator course, students were required to bring their own mobile devices to access learning content for the lectures, appraisals, and measurement portions of the course. “The students in this class showed us that the model works and that today’s learner adapts quickly and welcomes the concepts of self-paced learning, critical thinking, and facilitated discussions” (Mathews, 2013, p. 23). In other cases, individual military schoolhouses have employed alternate networks to enable students’ BYOD access to curriculum and collaborative teaching learning activities (Crane, 2017; Foster, 2016; McElroy, 2017; Roy et al., 2015). In addition to technical training, military-allied health training (which often collaborates with civilian institutions), has also served as an adopter of personal devices when training on subjects including anatomy and physiology, cardiopulmonary, radiology, nuclear medicine, physical therapy, medical laboratory, pharmacy, optometry, dental assistant, and neuro-diagnostic courses (Cochrane, Narayan, & Antonczak, 2016; Falconer, Gray, & Gaul, 2014;

Gwaltney et al., 2015; Jin & Bridges, 2016; Yammine & Violato, 2015). Since military-allied health training programs often integrate with civilian institutions through training affiliation agreements, isolating the military-unique portions of allied health training as related to student BYOD-use may also apply to the category of "higher education and BYODs."

The continued emergence of technology and personal devices within the military's training domain will be sustained by each of the services' updated training and education policies. The services have articulated their visions of training transformation in response to the DoDs most recently published training doctrine, the Force of the Future (Carter, 2015). The SecDef's vision is for training doctrine and execution to be organized as a force development function which traverses across the continuum of knowledges and skills required to support the services' missions. Since the DoD's construct of education and training hinges upon flexibility, mobility, and portability, each of the services' vision documents seek to leverage mobile technology to correlate with the DoD construct. The SecDef's transformational vision and goals will stretch the comfort zones of the services' existing educational and training policy, development, delivery, and evaluation. The DoD intentions of integrating training requirements into point-in-time delivery strategies indicate the re-evaluation of service institutions for efficacy (Beam & Hodges, 2015; Center for Service Support Public Affairs Office, 2016; Lange, 2016; Mathews, 2013; McGhee, 2012; Pomerleau, 2016; Wyche, 2014). The DoD education and training transformation will require that leaders and subordinates consider the integration of education and training across career-spans, modalities, and joint mission environments in just-in-time and point-of-need delivery strategies, by moving away from the current proliferation of episodic brick and mortar solution sets (Raybourn et al., 2017).

Summary

The literature review presented in this chapter focused on two learning theories which served as the theoretical grounding of this study: social transmission theory and transformational learning theory. These theories were selected as the framework of this study since the literature related to the topic of inquiry (BYOD) is centered on the context of student interaction and discourse. Social transmission theory articulates the importance of a collaborative learning environment, while transformational learning theory postulates that the learning environment will be enhanced by leveraging collaboration as an opportunity to encourage student discourse. These theories served as the foundation upon which military instructors' experiences with student BYOD-use were examined. To synthesize the related literature into a cohesive flow, the researcher began with a broad review of the integration of technology and lifestyle within the lives of students and employees, then transitioned to technology-use through BYOD in the commercial and higher education domains, and finally reviewed military training technology and the students' use of BYODs within the military education and training environment.

Employees are using their personal devices to bridge the gap between their personal and professional lifestyles and adopting an integrated 24-hour posture across both sides of their lives. People are now rarely disconnected from a network, since the availability and use of mobile hardware, software, and applications have become so prolific. The growing practice known as BYOD refers to a model in commerce where employers allow employees to use their personal devices to accomplish work tasks. In the higher education environment, BYOD refers to a model where learning institutions allow or encourage students to leverage their personal technology to support their objectives. Within the DoD, recent implementation of an education and training transformation initiative emphasizes mobile, flexible, and just-in-time training

which discourages episodic programs and encourages delivering more learning at the point of need. Student BYODs may have the capability to enable point-of-need training, yet little has been written about BYOD employment or its impact on military student collaboration and discourse. The literature review indicates a gap in knowledge on the teaching experiences of military instructors assigned to training institutions which embrace student BYOD-use environments.

The experiences of military instructors which accompany student BYOD-use and its role in collaboration and discourse have not been investigated. While theories applicable to classroom collaboration and discourse, along with research on military use of training technology have been explored, these frameworks of inquiry have not been applied to the military instructor's experience in leveraging military students' BYOD-use. It is this latter inquiry gap that this study endeavored to fill.

CHAPTER THREE: METHODS

Overview

The purpose of this transcendental phenomenological study was to describe the essence of the experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution located in the southeastern United States. This chapter contains a description of the research design, the research questions, the participant selection process, the research setting, the study procedures, the role of the researcher, the data collection process and analysis methods, the methods to establish trustworthiness in the study, and the ethical considerations for the study. The chapter concludes with describing the process used to establish and sustain trustworthiness and to ensure that ethical considerations were integrated into this study.

Design

This qualitative study used a transcendental phenomenological research method to describe the teaching experiences of military instructors assigned to a cyber-communication training campus located in the southeastern United States. Since I sought to describe the essence of military instructors' experiences, the qualitative method was selected to allow for the representation of reality through the eyes of the military instructors in order to share their stories and hear their voices (Creswell, 2013; Marshall & Rossman, 2006; Patton, 2002). The participants' descriptions of their experiences with the phenomenon served as the source of knowledge for this study (Moustakas, 1994). Therefore, my intent (through analysis) was to reduce the participants' descriptions of their experiences to textural and structural descriptions in order to unveil the essence of their experiences. This process correlates with the transcendental phenomenological research method which Moustakas (1994) described as "a scientific study of

the appearance of things, of phenomena just as we see them and as they appear to us in consciousness" (p. 49). Knowledge of essences would only be possible by bracketing all assumptions about the existence of an external world (Husserl, 1970). This procedure is also referred to as *epoché* and involves systematic steps to set aside various beliefs about a phenomenon in order to examine how the phenomenon presents itself in the world of the participants (Husserl, 1970). The approach used in this study is a valid design since its purpose was based on deriving a common meaning from the experiences of several participants (Guba & Lincoln, 1994; Moustakas, 1994; Patton, 2015), regarding the institutional endorsement of student BYOD-use in the classroom environment.

Research Questions

The following research questions guided this transcendental phenomenological study:

Central Research Question

How do military instructors describe their teaching experiences when incorporating student-owned devices into teaching and learning activities?

Guiding Question One

How do participants describe their experiences with the quality of student-to-student collaboration in a classroom which incorporates student BYODs into teaching and learning activities?

Guiding Question Two

How do participants describe their experiences with the quality of instructor-to-student collaboration in a classroom which incorporates students' BYODs into teaching and learning activities?

Guiding Question Three

How do participants describe their experiences with the quality of student-to-student discourse in a classroom which incorporates students' BYODs into teaching and learning activities?

Guiding Question Four

How do participants describe their experiences with the quality of instructor-to-student discourse in a classroom which incorporates students' BYODs into teaching and learning activities?

Setting

The setting for this study was a DoD institution focusing on enlisted cyber communications, satellite communications, and radio frequency communications training in the southeastern United States. Approximately 3,000 enlisted students attend this institution each year, and the school is affiliated with a college that is institutionally accredited by the Southern Association of Colleges and Schools-Commission on Colleges, a regional accrediting body recognized by the U.S. Secretary of Education. The school also sustains accreditation from a national cybersecurity agency. The institution offers 18 apprentice and advanced-level training courses for military enlisted students, international, and other government agencies who are entering cybersecurity specialties. The courses range in length from two to 16 weeks, depending upon their occupational specialty. The institution has 227 military instructors who are proportionally assigned to each course in correlation with the applicable course length and student volume.

The institutional command structure is composed of representatives from DoD cyber communications leaders who serve, on a two-year rotational basis, in positions which include

Commander of the institution, Director of Operations, and Chief of Training Delivery for 18 program/course director positions. All instructors are assigned to one of the 18 programs to deliver course curriculum. Students who attend the institution will, upon graduation, be assigned to various cyber-communication duties across the DoD. All students are from the DoD enlisted corps, mostly aged between 18–22 years old, and hold rank in the E-1 thru E-3 grades.

The training days are structured around an eight to nine-hour academic schedule for four to five days per week. Additional daily activities vary but include a common one-hour physical training session each morning before the start of classes. The students are housed two students per room, and the dormitories reside within the same complex as the classroom buildings. The classroom buildings are two stories in height and compartmentalize their occupationally-grouped training courses for ease of movement between classrooms and laboratories. Since this institution trains and educates students in cyber-communication specialties, the laboratories contain mock-up trainers and limited function equipment which approximates the conditions and physical environments to which the students will be assigned upon graduation. The lab designs contain simulated equipment and utilize procedures which approximate operational conditions with the goal of establishing a high degree of fidelity between the training domain and the operational mission environments. The classrooms and laboratories are all equipped with a high-speed network backbone to support the training devices, student-owned devices, and desktop computers which are used for automated test administration. One characteristic which is rarely experienced in a military training school is that the institution's leadership developed a pathway to authorize the use of student owned devices in the classroom beginning in June 2017. Considering the school's diverse population of students, this site provided a wide variation in instructor experiences and perceptions.

Participants

This study used a purposeful sampling method (Moustakas, 1994; Palinkas et al., 2015; Patton, 2015) by way of a questionnaire to measure current and/or former instructors' perceptions of the role of student personal device use in a classroom setting (see Appendix B). The questionnaire captured demographic information and attitudes regarding student devices in a teaching and learning environment. By using the information collected from instructor assignment data, 30 instructors were surveyed for their candidacy, criterion, and interest in participating in the research (Creswell, 2013; Patton, 2002). The most positively or negatively inclined responses on the questionnaire (regarding student BYOD-use) yielded potential participants whose experience with the phenomenon contained descriptions which were rich and thick (Denzin & Lincoln, 2003; Marshall & Rossman, 2006; Moustakas, 1994). To ensure the most diverse participant population with maximum variation (Cohen, Manion & Morrison, 2000; Creswell, 2013), the questionnaire was issued to course instructors across the grades of GS-09 to GS-12, from various ethnicities and nationalities, who possess teaching experience at the institution during the period of at least six months from the start of the student BYOD-use, and who can recall, reflect, and discuss their experiences with student BYOD-use. I selected 12 institutional instructors as participants in this study, a number which fulfilled data saturation (Denzin & Lincoln, 2003; Maxwell, 2013; Merriam, 2009; Moustakas, 1994).

As shown in Table 1, the 12 participants were all male with the youngest in his 20s, the oldest in his 70s, and the others ranging between the two extremes. All participants had at least three years, and most had at least 5 experience as a military instructor. Four of the participants were former instructors currently employed in other positions at the site (curriculum developers, management, etc.) or employed away from the site.

Table 1

Participant Demographic Data Summary

Participant	Gender	Age Range	Years Teaching	Position
Anthony	Male	40–49	5+	Instructor
Bryan	Male	30–39	5+	Former Instructor
Chris	Male	20–29	3–5	Former Instructor
Daniel	Male	40–49	5+	Instructor
Edward	Male	60+	5+	Instructor
Frank	Male	50–59	5+	Instructor
George	Male	50–59	5+	Former Instructor
Harold	Male	30–39	5+	Former Instructor
Ian	Male	30–39	3–5	Former Instructor
Jason	Male	30–39	3–5	Instructor
Kevin	Male	60+	5+	Instructor
Luke	Male	40–49	5+	Instructor

Procedures

This study was conducted after receiving approval from the Liberty University Institutional Review Board (IRB; see Appendix A). The approval restricted participant recruiting to civilian employees at the site. Potential participants were selected from the civilian population of instructors or former instructors who were assigned to cyber-communication training courses which have a high rate of student BYOD-use. Identification of courses with high utilization rates of BYODs supported a purposeful participant selection by correlating

instructor names and their course(s) of assignment.

Using this purposeful sampling method (Patton, 2002), and to remain in compliance with the USAF Human Research Protection Office policy of not encumbering government resources (government installation, facilities, equipment, employee time, government e-mail addresses, government telephones, or any related resources, etc.), I contacted 30 potential participants through either or both their social media addresses or personally through their institutions' bi-monthly, off-installation, off-duty hours, social-event breakfasts. Through these contacts, I determined their interest in serving as a participant in this study and obtained their personal e-mail addresses. Using their personal e-mail addresses, I sent them a recruitment letter to invite their participation and obtained their signed informed consent forms. Data collection was gained by using questionnaires, personal interviews, and focus groups. Targeting the potential participants, I issued the instructor questionnaire to 21 instructors to determine their candidacy in participating in the interviews and focus groups (Creswell, 2013; Moustakas, 1994). Using the criterion on the questionnaire, I narrowed the list to 12 interview and focus group participants. The interview and focus group data were collected, recorded, and stored in a password-protected file on a password-protected personal computer. All data were backed up via an online password-protected data back-up provider (Creswell, 2013; Seidman, 1998; Wolcott, 2009). The data collection process continued until saturation across themes was achieved (Moustakas, 1994).

The Researcher's Role

My role as the researcher in this transcendental phenomenological study was to bracket myself by way of uncovering my personal ego, attitudes, beliefs, judgement, and epistemology about the roles of student personal technology use in the classroom. Through this epoché

process, I obtained a description of lived experiences from the study participants in order to reveal the underlying meaning within the data (Husserl, 1970; Moustakas, 1994). I was born in 1963 and fall into the demographic of a digital migrant (Prensky, 2001). I serve as the Director, Education & Training for the USAF School of Healthcare Sciences, and my institution is separate and distinct from the institution serving as the focus of this study. I am in the 34th year of my career with the USAF as a civilian instructional systems specialist. My professional development began in 1985 as a police academy instructor and progressed through 13 different schools in positions which included curriculum developer, resource manager, instructor supervisor, course director, education and training evaluator, headquarters staff officer, director of academic support, and director of academic delivery, to my current position.

As an educational leader within the USAF, I possess extensive training and experience within the analysis, design, development, implementation, and evaluation phases of the USAF instructional systems model, and I am acutely sensitive to any barriers which prevent students from excelling within the teaching and learning environment. When considering the roles of collaboration and reflective discourse in enlisted military training classrooms, my attitude is to default in favor of any technology (including BYOD) which supports a permissive adult-learning atmosphere. I believe that technology can be used as an educational tool in the classroom to foster meaningful learning if it is not constrained to the role of a delivery vehicle, but rather used to engage learners and facilitate discourse. Additionally, I believe that social and educational digital content is cheap and plentiful, and that students need teachers to create connections, inspire meaning, and to develop wisdom in order to assess situations, think critically, and make informed decisions.

I believe that adult students learn better when they are able to integrate the academic aspect of their life with other areas of their life through collaborative learning, social exchange, faith collaboration, esprit-de-corps, shared sacrifice, and teamwork. While I have no functional connectivity to the institution's instructors or students, I am nonetheless concerned for the students who graduate from the institution. As a DoD educator, I possess an acute situational awareness that these graduates will perform their duties in hostile environments. Since these graduates will serve in expeditionary missions, combatant lives may hang upon the graduates' abilities to provide prompt and secure communication networks.

As an educational leader within the DoD, I practice within a quantitative domain where metrics exist for nearly every function. I believe that my profession would benefit from scholarly qualitative research by adding additional context to existing quantitative outlier data, and to better inform quantitative data-based decisions. At this point in my career and life, I cannot imagine a more important role nor a better fit for my professional and spiritual calling than to contribute to the positive learning experiences of future cyber communications specialists.

Data Collection

This qualitative study used a transcendental phenomenological research design to describe the essence of the experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution located in the southeastern United States. Data collection for this study began after receiving approval from the Liberty University IRB. No government resources (installation, e-mails, facilities, equipment, telephones, etc.) were used in this study. Data on participant experiences were collected using questionnaires, interviews, and focus groups. Prior to engaging the study participants, I piloted the interview

questions with former instructors previously assigned to the institution. The piloting feedback resulted in resequencing the interview questions, adding more detail to the overview of the interview, and slowing the pace of interview. Through the data analysis process, I strived to establish and sustain trustworthiness through triangulation of the data to form themes. The data collection process began with the participant questionnaire.

Participant Questionnaire

The questionnaire for this study served two purposes: First, it supported the selection of participants for subsequent interviews and focus groups who possessed a maximum variation in attitudes and perceptions regarding the use of Information and Communication Technology (ICT) in a military training environment, and second, for those selected for the study, it also furnished an attitudinal and perception data source and triangulation component during the analysis. The instrument contained selection-type questions to capture the demographics of current and former instructors, and also used the Teacher Attitudes towards Information and Communication Technology Scale designed by Albirini (2006). The questionnaire was adapted from both the Albirini (2006) and the Thompson (2017) questionnaires, and contains 46 questions which measured the ranges of respondents' attitudes by using a Likert-type scale along a continuum from strongly agree to strongly disagree.

As applied to this research, the questionnaire was used to study a population, not through the lens of demographic frequencies or distribution, but rather to study the diversity of the population for the purpose of exploring meanings and experiences (Fink, 2003), with the goal of capturing varieties of ICT attitudes from former instructors (Jansen, 2010). Following the receipt of IRB approval, I obtained personal e-mail addresses and forwarded the questionnaire to potential participants. Prior to issuing the questionnaire, potential participants were sent a study

recruitment letter which included an informed consent letter. Questionnaires were issued to participants following the receipt of their signed informed consent form.

Interviews

The interview method was selected for this study since it supported the collection of rich, thick data from participants and provided insight to understanding their experiences (Castillo-Montoya, 2016; Creswell, 2013). The goal of these interviews was to capture the participants' experiences, the context of those experiences, and the meaning which the participants derived from the experiences. The interviews were audio-recorded and used open-ended, conversational, face-to-face discussions at off-installation sites to allow participants to tell their story and to share their knowledge of the phenomenon. As participants shared their stories, their descriptions inspired a "meaning-making experience" (Seidman, 1998, p. 1) that, when integrated within the context of the experience, provided a pathway to reveal the essence of the experience (Moustakas, 1994). To support this pathway, one follow-up interview was conducted to continue unpacking the participants' experiences and the context of those experiences to reveal the essence of the experiences, which was the goal of the study (Creswell, 2013; Seidman, 1998). Through this process, I entered the experiences of the participants as they leveraged student devices in their teaching practices. Prior to the interviews, I reviewed these questions with two former instructors who met the participant-selection criteria yet were unavailable for the data collection phase.

Piloting the interview questions consisted of trying out the initial interview questions under conditions which approximated the environment in which the actual study interview occurred (Baker, 1994). By piloting interview questions, I gained valuable insight, under controlled conditions, of how the questions would support the study (Maxwell, 2013; Merriam,

2009). The additional investment in time and cost required to pilot the interviews and the questions provided me with feedback on my question validity, insight into my participant-rapport building, and efficacy of my interviewing techniques. The piloting feedback and recommendations resulted in my resequencing the interview questions, providing participants a more detailed overview of the interview, and slowing the pace of the interviews. In sum, piloting the interview questions and process supported my actual interview performance during the data collection phase.

The initial questions were designed to obtain background information about how the participants were selected for instructor duty at the institution. These are what Patton (2002) referred to as experiential and behavioral questions, which seek information about what the participant has done. The questions were shaped by the literature related to the inquiry and focused through the theoretical framework of the study. In most cases, the questions were developed around the construct of "how" the participant experienced the phenomenon relating to student collaboration and discourse within the learning environment. The inquiry of "how" was selected with the intention of capturing the sequential and cumulative event components of the participants' experiences (Seidman, 1998). By reconstructing this sequence of components as experienced by the participants, I gained insight into the context of the experiences which were inspired by the phenomenon (Seidman, 1998). The interview questions were as follows:

Standardized Open-Ended Interview Questions

1. What inspired you to consider becoming a training instructor?
2. Please describe the process you followed to be assigned as a training instructor?
3. How would you characterize your experience of teaching at the institution?
4. Describe how student devices impacted collaboration in your classrooms.

5. Describe any impact which student devices had upon your ability to collaborate with your students in the classroom.
6. Describe any impact which student devices had upon your student's ability to collaborate with other students in the classroom.
7. How did you modify (if at all) your classroom practices to leverage student devices to sustain classroom collaboration?
8. Describe how student devices impacted productive discourse in your classrooms.
9. Describe any impact which student devices had on your ability to establish discourse with your students in the classroom.
10. Describe any impact which student devices had upon student-to-student discourse in the classroom.
11. How did you modify (if at all) your classroom practices to leverage student devices to sustain classroom discourse?
12. What was your immediate thought or feeling when you were invited to participate in this study?
13. What other information related to your instructor experiences would you like to add?
14. What are your thoughts about doing a follow-up interview, if needed?

The theoretical framework for this study included Mezirow's extension of Dewey's theory which postures that learning will be enhanced by leveraging student-teacher collaboration (Dewey) as an opportunity to encourage reflective and critical student-to-teacher discourse (Mezirow) within the classroom. This combined theoretical framework informed both the central and guiding research questions. In turn, the guiding research questions shaped the participant interview questions indicated in the previous paragraph.

Questions 4–7 are related to instructor experiences with student-owned devices in the classroom (the phenomenon), and seek to gain an understanding of how those instructors describe their experience of the phenomenon. The questions would be classified as knowledge and sensory questions (Patton, 2002). Knowledge questions seek to gain information about the facts as understood by the participant, and sensory questions inquire about what the respondent heard or saw. Since Dewey's social transmission theory focuses on the importance of a collaborative learning environment, these questions sought to obtain a description of instructor's perspectives regarding how a collaborative classroom environment was impacted by the students' use of BYODs.

Questions 8–11 are related to the instructor's perspectives regarding any correlation between student collaborative BYOD-use and the quality of classroom peer-student discourse (Lee, 2015). These questions correlate with Patton's (2002) description of experiential, knowledge, and sensory questions since they inquire about what the participant has done (experiential) in response to a situation, or query the respondents' understanding of the facts (knowledge questions). The sensory questions sought information about what the participant has observed regarding the phenomenon. These questions aimed at obtaining a description of instructor experiences regarding the impact (if any) to their instructional practices in sustaining student-instructor discourse, which may have been impacted by the use of student BYODs. The final questions, depending upon the response, may be classified by any of the previous descriptions or include the additional category of feelings questions. Feelings questions are developed to solicit information about the participants' emotional responses to their feelings and thoughts relative to the phenomenon (Patton, 2015).

Focus Groups

Once the individual interviews were completed and the transcripts of the interviews were reviewed, analyzed, and member-checked (see sample transcripts in Appendices E and F), I cross-checked the data by conducting three focus groups to support the credibility of my study (Guba & Lincoln, 1994) and to gain a richer understanding of the phenomenon (Bradbury-Jones, Sambrook, & Irvine, 2009). Two of the focus groups were conducted in person and one by way of a (non-governmental) on-line video teleconferencing application since the latter group was too geographically separated to gather in person (Remler & Van Ryzin, 2011). I used an unstructured discussion format to encourage participants to share anecdotes related to events and feelings which occurred during the phenomenon (van Manen, 1990). Using focus groups allowed me the opportunity to gain the collective perspectives of participants for maximum variation, as well as to collect rich perspectives from participants as they contributed input to support a deep insight into the phenomenon (Moustakas, 1994).

The focus groups consisted of four participants with varying prior relationships (Patton, 2002), so that they had enough space to each share individual experiences while questioning each other's responses (Bradbury-Jones et al., 2009). My focus group questions were as follows:

Standardized Open-Ended Focus Group Questions

1. What motivated you to become an instructor?
2. Did you volunteer for instructor duty or were you non-voluntarily assigned?
3. What were the challenging aspects of your instructor experience?
4. What were the rewarding aspects of your instructor experience?
5. Please describe your experiences with student-instructor discourse while students used their devices in the classroom.

6. Please describe any modifications to your teaching technique to sustain classroom collaboration while students used their devices.

The focus groups allowed participants the opportunity to confirm, clarify, or refute the correlated data which I obtained during the interviews (Creswell, 2013; Glesne & Peshkin, 1992; Patton, 2015). Additionally, these groups provided information about instructor experiences which was overlooked during the interview process. The additional data obtained by this process provided me a balance in perspectives among participants and also identified a few extreme perspectives related to the phenomenon (Moustakas, 1994).

Data Analysis

The data collected from this study were analyzed using Moustakas' phenomenological model process (Moustakas, 1994). The first step in this transcendental phenomenological study analysis was to ensure that I followed the process of bracketing (Husserl, 1970). Bracketing required that I describe personal experiences, attitudes, and beliefs about the topic of inquiry in order to compartmentalize and set aside these factors and focus solely on the topic and questions (Moustakas, 1994, p. 97). Using this process, I made my bias clear by documenting it in my field notebook prior to the analysis of the phenomenon (Moustakas, 1994). Following the epoché process, I used the process of phenomenological reduction which included horizonalizing, clustering horizons into themes, and organizing the horizons and themes into textural descriptions (Moustakas, 1994, p. 97).

Horizonalizing treats participant statements (captured within transcribed interviews) as having equal value, as no statements will be summarily discarded unless they are deliberately determined to be irrelevant to the research questions, duplicative, or overlapping within or between participants (Moustakas, 1994). The horizons which emerged from this reduction

described experiences from the vantage points of self-awareness, self-reflection, and self-knowledge (Moustakas, 1994, p. 95). Horizons were then clustered into emergent categorical themes to organize the data into compartments for deeper analysis. This analysis included developing textural descriptions to leverage the context of the participant experiences and obtain a fuller description by interweaving "person, conscious experience, and the phenomenon" (Moustakas, 1994, p. 96). Coherent textural descriptions of the experiences, described by Moustakas (1994) as "intensities; ranges of shapes, sizes, and spatial qualities; time references; and colors all within an experiential context" (pp. 91-92), emerged as I continued to immerse in their context by conducting multiple passes across the data. Following this reduction process, I next engaged imaginative variation to seek possible meanings from the data from varying points of view.

Imaginative variation used textural descriptions to seek meanings by creatively applying varying perspectives, opposing paradigms, and positional viewpoints to unveil not only what the participants experienced with the phenomenon, but also how the phenomenon was experienced (Moustakas, 1994). The goal of the imaginative variation process was to determine the structural descriptions of an experience which included "time, space, materiality, causality, and relationships to self and to others" (Moustakas, 1994, p. 99). To develop imaginative variation, I sought to vary the possible structural meanings, recognize underlying themes or contexts accounting for the emergence of the phenomenon, and consider participant feelings or thoughts with reference to the phenomenon. The goal of this effort was to operationalize the paradigm that there exists no single route, but countless pathways, toward obtaining the truth (Moustakas, 1994, p. 99).

Through imaginative variation I uncovered the structural descriptions of the experiences and illuminated the factors of "how" participants experienced the "what" they experienced (Moustakas, 1994). Through continuously pursuing a synthesis of textural and structural descriptions using phenomenological reduction and imaginative variation of the data (Moustakas, 1994, p. 100), from my own perspective I represented the essence of how the participants collectively experienced the phenomenon at a military enlisted training institution in the southeastern United States.

Trustworthiness

The trustworthiness of a study refers to the degree to which the target audience finds the data, the interpretation, and the methods meaningful (Polit & Beck, 2014). Trustworthiness, also referred to as the rigor of a study (Connelly, 2016), describes the degree of confidence which the readers of a study will assign to its contents. To establish trustworthiness within this study, I ensured rigor in its processes to sustain credibility, dependability, confirmability, and transferability (Guba & Lincoln, 1994). To establish credibility, I ensured that methods are followed to support and refute interpretations of this study (Creswell, 2013). Dependability and confirmability were sustained by ensuring the reliable methods were used to obtain confirmability of the study's results. I also strived for a high degree of transferability thorough the documentation of processes and results to ensure that another study conducted in a similar setting would yield similar results and conclusions (Creswell, 2013).

Credibility

The credibility of a study is a description of the degree of truth which a reader will assign to the study, its findings, and therefore its conclusions (Amankwaa, 2016; Connelly, 2016). Within this study, I sustained credibility by purposeful sampling through the participant

questionnaire, verifying the timelines of participants' work at the institution, and selecting for maximum variation of the participant sampling. After purposeful selection of my study participants, administering the survey, and conducting the interviews, I supported the credibility of my study by sharing the data with the participants, through the member checking process, to assess the accuracy of their descriptions of the experiences (Creswell, 2013; see sample transcriptions in Appendices E and F).

Researchers use the member checking process to both assess the accuracy of account and to respect the dignity of the participants. As participants become engaged in the interview process, they are sharing not only their insights into their personal experiences with the phenomenon but also their paradigms which contribute to shaping those experiences (Connelly, 2016). Those paradigms are closely held glimpses into the framework of how participants view themselves in society and may be impacted by issues associated with gender, race, ethnicity, and class (Seidman, 1998). I deliberately planned my interaction with the study participants by establishing and cultivating rapport from the initial contact phase, through introductions, interviews, and member checking, all with the goal of sustaining a high degree of credibility. To support credibility, I also used reflexive journaling (Wolcott, 2009) to encourage my self-accountability for sustaining standards and disclosing engagement within the study process to include bracketing of my attitudes, beliefs, thoughts, and feelings about my inquiries (Ahern, 1999; see excerpt from my reflexive journal in Appendix G).

Dependability and Confirmability

A study's dependability is a description of the degree of stability of the data within the study over time (Polit & Beck, 2014). The difference between the dependability of a qualitative study and the reliability of a quantitative study is that the stability of a participant's experiences

regarding a phenomenon in a qualitative study may change over time, as his or her perspective evolves. The reliability of quantitative study outcomes, provided that the controls are effective, is more stable over time (Leung, 2015). In this study, I enhanced dependability by incorporating peer reviews through experienced scholars to review my data and ask questions (Creswell, 2013).

Confirmability in qualitative research refers to findings which are consistent and will occur without regard to which researcher is conducting the study (Polit & Beck, 2014). The member checking process supported the confirmability of this study; therefore the cross-pollination of dependability and confirmability served to enhance the trustworthiness of the research. Both of these characteristics were supported by developing an audit trail through the maintenance of research logs, which contained process notes, participant debriefing feedback, peer discussions, and decision points which occurred during the study (Connelly, 2016; see excerpt from my audit trail in Appendix H). Additionally, I also pursued triangulation to look for themes across different types of data, instruments, and different participants, as these sources supplied multiple perspectives on the participants' experiences (Creswell, 2013).

Transferability

Transferability refers to the degree to which the study's findings are applicable to persons in other environments which approximate the site of the phenomenon (Lincoln & Guba, 1985; Seidman, 1998). This characteristic is supported when the researcher collects a set of rich, thick descriptions of the participants' experiences through an understanding of the people studied, their context, their environment, and providing a full disclosure of the analysis process (Amankwaa, 2016). As I progressed through the study, I strived to capture and incorporate a rich, thick description of the participants' perceptions and experiences. Providing a rich, thick

description included the complexity of the patterns revealed during analysis of the data, which positions readers of the study to make an informed decision regarding transferability of the findings (Creswell, 2013).

Ethical Considerations

There was minimal risk in terms of the health and well-being of the participants. Ethical considerations of this study were addressed during the course of this research beginning by first securing IRB approval from the research institution including the site, setting, sampling procedure, methods of data collection, and methods of data analysis (see Appendix A). After receiving IRB approval, each participant was provided a description of the study (see Appendix C) and signed an informed consent form (see Appendix D). Protection of participant identities was assured to mitigate the possibility of negative participant reactions following participation in this study. Participant identities were protected by way of pseudonyms and unique identifiers, and research data are password protected on my personal computer and an on-line back-up application. At the conclusion of the research study, participants were briefed on the results, implications, and recommendations of the study as a form of reciprocity (Barron, 1999; Creswell, 2013; Seidman, 1998; Wolcott, 2009).

Summary

The purpose of this transcendental phenomenological study was to describe the essence of the experiences of military instructors who leverage student BYODs in their teaching practices within an enlisted training institution located in the southeastern United States. This chapter contained a description of the research design, the proposed participant selection process, the research site, procedures, and data collection and analysis methods. The chapter concluded

with describing the process which I used to establish and sustain trustworthiness and to ensure that ethical considerations were integrated into this study.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this research was to describe the experiences of military instructors who have taught at a DoD technical training institution which has enabled the use of student-owned devices in its classrooms and laboratories. Chapter Four presents the findings of this research which used the data collection and analysis methods described in Chapter Three. The data collection and analysis were conducted over a four-month period and yielded themes and responses to the research questions which were used to guide this research. This chapter also provides a narrative of participants, using pseudonyms, and a description of how the themes were developed from the participant data. The four themes which emerged from the data collection and analysis were as follows: (a) adopting a BYOD culture, (b) student primacy, (c) BYOD instructor attributes, and (d) learner ownership. These themes answered the research questions of this transcendental phenomenological study presented in the previous chapter.

Participants

The participants for this study were recruited from a DoD technical training institution located in the southeastern United States. The selection criteria required that participants spent at least six months as a military instructor teaching in a course which enabled students to use their personal devices in the teaching and learning environment. The study included 12 participants who obtained their experiences as current or former instructors. The participants were all male, as there were only two female instructors within the course which enabled student devices, and neither possessed the prerequisite experience for this study. Participants were also Caucasian, as instructors from other ethnicities either did not reply to recruiting invitations or did

not possess the required experience. Age group demographics of the participants were diverse with representatives ranging from their 20s to their 70s.

Anthony

Anthony is a DoD civilian military instructor in his 40s and has about 15 years of teaching experience at the study site. He is also a retired uniformed military instructor and was part of the initial implementation of the BYOD training delivery method. He is married with two adult children and prefers to teach using hands-on performance whenever feasible. While attending an electronics course 25 years ago, his teacher asked him to consider submitting an application to become an instructor later in his career. Since the teaching profession had always interested him, he applied and was placed as a DoD instructor in 2003. Anthony described the exchange between he and his instructor which led to his transition into teaching as follows:

> At the end of that six week course he [my instructor] pulled me out in the hallway and challenged me to put in my package to become [an instructor] because he was convinced I would be good at it, just based on our interactions in the classroom. And so I went home and I talked to my wife about it and she said, "Yeah, I think you'd be good at it. Go for it." So I put the package in in the beginning of 2003, June of 2003. By October of 2003 I had been selected to become an instructor.

Bryan

Bryan is also a civilian employee at the institution and currently serves in a management role. He is a former non-uniformed military instructor for 11 years and in his late 30s. He is married with four children and describes himself as a workaholic who has championed the BYOD initiative at his institution by campaigning for the funding and equipment required to implement student device use. His teaching preferences are the discussion method and face-to-

face student interventions. He began his teaching career as a DoD intern and migrated through subsequent assignments at several different schools before arriving at the study site. Bryan is unique to this group of participants as he does not have prior uniformed military experience.

Chris

Chris is a former uniformed military instructor at the study site who is now employed as an information technology specialist at a different organization. Chris has four years of teaching experience, most of which included implementing the student-centered BYOD teaching environment within his training program. Chris was the youngest participant, in his late 20s. He describes himself as ambitious, requiring constant movement in improving his environment. He feels that his principle contribution to implementing BYOD was motivating his peer teachers in seeking continuous opportunities to enhance their teaching efficacy through student device use. He described his initial teaching experience as follows:

> So having those opportunities present themselves to me not only allowed me to keep my love of instructing, because we were constantly trying out new things, we were constantly trying to ensure that, "How can we make this stick better to the students?" So we started coming up with game plans and stuff like that. At that point, we had a bunch of websites that we housed internally for the instructors to get references. And then it kind of dawned on us, "Why don't we do this to where students can get the stuff?"

Daniel

Daniel is an instructor who was initially reluctant to embrace the BYOD training delivery method. He is in his middle 40s and married with over 10 years' experience as a civilian and former uniformed military instructor. Daniel is retired from the military and his preferred method of teaching is hands-on performance. While an advocate for sustaining an active

learning environment and the use of classroom technology, Daniel nonetheless retained a strong preference for instructor-centered training delivery. Upon the integration of BYOD methods to his course, Daniel testifies to being a late adopter of the student-centered environment, as he believed the value which he brought to the learning environment would be forever corrupted by student BYOD. After assessing improved student performance, Daniel became a convert to endorse the judicious and deliberately planned use of BYOD integration. He believes that it was his satisfaction of the teaching profession which enabled him to adapt to student BYOD-use:

> For many, many, many years, from when I was a little kid, all the way through middle school and high school, I've always found training pretty interesting. In high school I did a lot of tutoring and, also, in the ROTC, Junior ROTC program I was the training guy, so I would train. And then, as I enlisted into the military, I found the training environment attractive. It was something I wanted to do in the future. Early on, I've had that motivation to come back, at some point in my career, to teach, and it did come to fruition.

Edward

Edward, now in his 70s, was the eldest participant in the study and also possessed the broadest experience set. He enlisted in the armed forces during the Vietnam era and his initial teaching experience began shortly thereafter:

> I ended up in the classroom. I wasn't, didn't exactly know what I was or where I was going, but I, somehow it sat well with me. I started to really enjoy it, even though I only had two stripes, and I had students training in my classes of 35 students with three and four stripes, and five stripes. Anyway, so I kind of grew into it. The more I taught, the more I loved it. I still feel exactly the same way.

Following his enlistment period, Edward completed his electrical engineering degree and licensure, eventually managing a regional power production facility, and becoming a public school teacher. His prior positive experience as a uniformed instructor eventually inspired him to return to military instructor duties as a DoD civilian employee, for which has served for 15 years. As an early adopter to leveraging classroom technology to encourage student collaboration, Edward welcomed the migration of the student BYODs into his course.

Frank

Frank is a former uniformed military instructor, a former public school teacher, and a current non-uniformed military instructor as a DoD civilian employee. He is in his 50s, retired from the military, married, and listed the demonstration method as his preferred teaching style. Possessing experience in both the public education and DoD occupational training sectors was not something that Frank would have initially predicted when he reflected on his initial transition into teaching:

> Actually, it was by accident. I was a young communications technician at my first duty station, and my supervisor actually received orders as a non-volunteer instructor. He didn't want to go. I did, because it was close to home. So, we arranged a swap, and I actually took his orders. Once I got here, I really fell in love with training and military education. I had already moved on with my post-educational life. Had already done some college work, and midway through my teaching experience here, changed majors, and switched to education, because I thought that was what I wanted to do when I finally retired at some point.

Frank's experience in the public schools included teaching English and working as an educational technology coach within the professional development office for a city school

system. After 12 years in the school system, Frank also felt called to return as a civilian to the military instructor profession. Frank believes that his prior military and public school system experiences prepared him to become an early adopter and advocate for student-centered curriculum at his DoD institution.

George

George never anticipated becoming an instructor. Like many of the other participants, he trained to become an electronics technician and was later reassigned as a uniformed military instructor. After approximately ten years in the military, he transitioned to the commercial microchip sector for 11 years until his company relocated overseas. At that point he reflected on his initial instructor experience:

> I was non-volunteered [for uniformed instructor duty]. I actually tried to get out of it, but I actually fell in love with it. I actually enjoyed it. I actually, once I started doing it and seeing a student with the light bulb come on, that whole thing they always say. It is. It's one of those things you're like, "Oh, wow. He understands, and I made him understand." That's what led me into it.

Now in his late 50s, George has worked as a DoD civilian at the institution for over 13 years in various roles as an instructor, curriculum developer, financial manager, and instructor supervisor. His preferred teaching method is hands-on performance. George experienced the initial implementation of student-owned devices within his classroom and was encouraged by the students' motivation to integrate their BYOD into their training.

Harold

Harold always wanted to be a teacher. He is a former uniformed instructor who worked at the study site for over four years, most of which involved the students' use of BYODs. Now

in his early 30s, he is currently employed elsewhere as an electronics technician and still takes the opportunity to develop newly hired staff. On reflection, he preferred the hands-on training and discussion methods of teaching. When asked why he always felt the desire to become an occupational teacher, Harold replied,

> Ever since probably in middle school, high school I always found that I learned in an environment that I was explaining topics to other people. There were those that I like to distill very complex idea and thoughts down to the simplest form and then explain that to someone else to truly understand a topic. I always found that that was best way to learn something. And I never really put that together. The doubt was teaching other people. I always kind of attributed that to I was explaining it to myself in a simple fashion.

He viewed the use of BYOD in his courses as a learning enabler and felt that leveraging the student devices was a step toward transforming occupational training into a social experience which encourages self-directed learning.

Ian

Ian is also a former uniformed military instructor who has about four years of experience at the school, most of which included student BYOD experience. In his early 30s, Ian was also on the younger side of the participant age demographics, and is married with small children. He is currently employed away from the study site as a certified information technologist supporting the network operations of his company. Ian's preferred teaching style was the discussion method, which he felt supported his adaptability to the student-centered teaching environment at the study site. When reflecting on his initial desire to become an occupational teacher he emphasized that individual student interactions were important to him:

> As a talker, my family has a history of talkers, so it just kind of came natural, and I was looking for a new opportunity. You get a lot more exposure to different ways of life, and different thought processes, and you get ages from 17 all the way up to 35. You get a full gamut of different people. I think the diversity is . . . The different conversations I had on a daily basis was probably the most valuable thing I had aside from technical instruction, which is just the job. The people are by far the best thing. I enjoyed interacting with them, on a daily basis. I miss it, still.

Jason

Jason is in his 30s and a current DoD civilian military instructor with approximately nine years of experience at the study site. He completed his instructor training and about three and a half years initial experience as a former active duty teacher. Upon leaving the military, Jason went to college and afterward returned to the institution as a non-uniformed instructor teaching courses which employed BYODs. While most of the participants were either initial advocates or later adapted to the student's use of personal devices, Jason remained reticent to endorse BYOD in his classroom. As one of the few participants who still questioned the usefulness of leveraging BYODs, he offered some valuable counterpoints to the collection of instructor experiences. Jason also shared perspectives similar to other participants, such as his initial reluctance to become an instructor while still in uniform, as he never envisioned teaching as an occupation of interest:

> Then I realized I had a lot to learn and, I learned some equipment, a lot of equipment, and once I taught I figured out that teaching this makes me understand it more. So it was beneficial to me to actually teach it and train it. And, since then, I've been here nine years

> now and I've learned so much from just having to understand that enough to explain it to the students.

Kevin

Kevin was the second oldest participant, in his mid-60s, and serves as a civilian DoD military instructor. He is retired from the military, having spent most of his career as a communications technician. While still in uniform, Kevin spent four years teaching radar systems to apprentice students. Following his retirement, Kevin returned to the DoD as a civilian military instructor at the study site, where he has taught with the use of student BYODs for the past five years. While an inquisitive self-directed learner throughout his life, Kevin never anticipated becoming an occupational instructor. With some experience, he found that he enjoyed the profession primarily because of his personal exchanges with students:

> I like to share stuff with students. The technical stuff, that's all very well and good, but I enjoy the interaction with other people. Especially young people. Like, I just see them as a big sponge waiting to soak up advice. I like to think that I'm making some kind of positive influence in their lives that's gonna help them later on. Whether they remember me or not, I don't care, as long as something comes out of it that helps them as a person. And that's why I teach and why I enjoy doing it.

Luke

Luke is in his late 40s and was in the middle of the age demographics. He has middle-school aged children, and initially resisted the idea of becoming an instructor. Like several other participants, Luke is also retired from the military and obtained his instructor training and approximately eight years of teaching experience while still in uniform. Following his retirement, Luke returned to the institution as a DoD civilian employee after the migration to

student device use. When compared to several other participants, Luke was more pragmatic than enthusiastic about BYODs in the classroom. His default reaction was to adapt to any technique or technology which improved his students' learning efficacy. Once he assessed his students' preferences for personal devices against their increased performance in his course, he focused on adapting from the instructor-led to student-centered curriculum:

> Let's be honest, the job security that I get from this job, is that light bulb, that ah-ha moment that the students get when they finally understand a concept that they've been struggling with. . . . I thought, I'm really going to make a difference because these guys are going to go out and they are going to be the next generation that fills my shoes.

Results

The purpose of this phenomenological study is to describe the experiences of military instructors who leverage student BYODs in their classrooms within an enlisted military training institution in the southeastern United States. Participants for this study were selected through purposeful and snowball sampling from criteria based on pertinent experience with the phenomenon. Approximately 30 instructors were contacted by e-mail or social media, sent recruiting letters, informed consent documents, and the instructor questionnaire. Of the respondents who were qualified and willing to cooperate in the study, 12 participants were selected to interview. Three focus groups of four participants each were conducted following the interviews. The 12 participants were current and former instructors who possessed the prerequisite experience with BYODs at the study site in the southeastern United States. Each participant had at least six months of experience working within a military technical training course which enabled the use of student devices in the classroom. All of these participants were male and ranged in age from their 20s to over 70 years old. The participant data was collected

through instructor questionnaires (for results see Appendix I), semi-structured interviews, and focus groups, all of which were obtained in person or by way of an on-line conferencing application. The in-person interviews and focus groups were completed in leased conference rooms outside of the government installation where the institution resides. Following the interviews, all participants were invited to review the transcripts and make any corrections, additions, or deletions to the text. No corrections were submitted or made. The analysis of the data collected across the three instruments revealed four main themes and thirteen subthemes, which correlated and extended the review of the relevant literature.

Theme Development

This research was conducted to understand the experiences of military instructors who leverage student BYODs in their classrooms. The data collection included three instruments: an instructor questionnaire, a semi-structured interview, and a focus group. Prior to collecting the data, I followed the phenomenological process of epoché (Creswell, 2013; Moustakas, 1994), bracketing my beliefs, attitudes, and perspectives about the use of student BYOD in classrooms. I performed this epoché by reviewing and answering each of my relevant interview questions and recording field notes on the conditions of the interview environment, recording my pre-suppositions of the interviewees, and annotating my emotional state prior to conducting the interviews and reviewing the transcripts. This process helped me to articulate and set aside personal biases so that I could review the data with a focus on the participants' perspectives. I repeated this process through multiple passes across the transcripts to unveil common ideas and codes within and between the participants' responses.

Using NVivo 12 Plus (version 12.3) for Windows, I entered the codes and then performed phenomenological reduction of each interview, focus group, questionnaire and the

research field notes while using horizonalization and imaginative variation to cluster the horizons into themes. The four themes which emerged from this process were adopting a BYOD culture, student primacy, BYOD instructor attributes, and learner ownership. The themes were synthesized to understand the essence of the participants' experiences within the phenomenon. Each of the research questions was represented in the individual interview and the focus group questions. The correlation between the research questions and interview and focus group questions is illustrated in Table 2.

Table 2

Correlation Between Research Questions, Interview Questions, and Focus Group Questions

Research Questions	Interview Questions	Focus Group Questions
CQ: How do military instructors describe their teaching experiences when incorporating student-owned devices into teaching/learning activities?	1–13	1–6
GQ1: How do participants describe their experiences with the quality of student-to-student collaboration in a classroom which incorporates students' BYODs into teaching/learning activities?	5,7,8	3,4,6
GQ2: How do participants describe their experiences with the quality of instructor-to-student collaboration in a classroom which incorporates students' BYODs into teaching/learning activities?	5,6,8	3,4,6
GQ3: How do participants describe their experiences with the quality of student-to-student discourse in a classroom which incorporates students' BYODs into teaching/learning activities?	9,11,12	3,5
GQ4: How do participants describe their experiences with the quality of instructor-to-student discourse in a classroom which incorporates students' BYODs into teaching/learning activities?	9,10,12	3,5

As the information and participant statements from the interview and focus group transcripts was coded, the codes were clustered into themes. The correlation between the themes, the subthemes, and samples of participant statements from the interview and focus group transcripts is summarized in Table 3.

Table 3

Correlation of Themes, Subthemes, and Sample Participant Quotes

Themes	Subthemes	Participant Quotes
Adopting BYOD Culture	Faculty Reflex	*I think that changed the mentality of instructors*
	Student Reaction	*It broke barriers of communication for them*
	Empowerment	*They wanted more than we were able to offer*
Student Primacy	Engagement	*You really have to get yourself more involved*
	Subordination	*Students ask, "Why don't you…do things for more money?" It's because of you guys*
	Rapport	*Talk with them and treat them like an adult. It's important how we treat them*
BYOD Instructor Attributes	Passion/Commitment	*The challenge comes from our passion for doing the job. If we had to go that extra mile to get them to understand what was going on, we took the time, even if we didn't have the time*
	Adaptability	*We're having to adapt our communication styles to the students based on their individual understandings*
	Critical Thinking	*Nobody instructed us that this is where the future of the course is going, but we just went that way with the technologies we experimented with*
Learner Ownership	Self-Directed Learning	*No longer are we kicking students out at break time. They let students stay and study because they want to. They actually want to learn*
	Peer-Peer Learning	*They get together and talk about the modules they're on and they get help from their peers*

Facilitating & Mediating	*We wanted them to be able to reach out to their peers and learn from each other*
Personal Learning System	*By them taking the smallest amount of ownership in that learning process-these are my notes and this is my device really helps drive ownership through the process of learning*

Table 4 summarizes the themes, the subthemes, and the code frequency of use.

Table 4

Code Frequency from All Data Collection Devices

Themes	Subthemes	Code Frequency of Use
Adopting BYOD Culture	Faculty Reflex	117
	Student Reaction	63
	Empowerment	59
Student Primacy	Engagement	58
	Subordination	25
	Rapport	35
BYOD Instructor Attributes	Passion/Commitment	72
	Adaptability	69
	Critical Thinking	38
Learner Ownership	Self-Directed Learning	49
	Peer-Peer Learning	47
	Facilitating & Mediating	37
	Personal Learning System	83

Theme 1: Adopting a BYOD culture. Once I began the data collection process, I immediately detected the significance that the BYOD culture had on the participants. While completing the data analysis process, this theme was among the first to emerge. The participants offered mixed comments on the contrast of the BYOD environment with traditional instructor-

led teaching practices. On the other hand, student reactions to BYOD were consistently positive and associated with the migration to student-centered instruction. Data analysis uncovered three subthemes related to the theme of adopting a BYOD culture: faculty reflex, student reactions, and empowerment.

Faculty reflex. When viewing the data through the lens of student collaboration and discourse, the participants reported both positive and negative initial reactions to their transition from their traditional instructor-centered experience to a student-centered BYOD environment. Participants' responses were evenly divided (four each) between neutral, agree, and strongly agree when rating the questionnaire statement: "Teaching with computers offers real advantages over traditional methods of instruction." Individual interviews and focus group data inspired a wider range of reactions when participants were asked about teaching in a student BYOD environment. George agreed on the questionnaire to the advantages of teaching with computers, while his interview response was more direct: "Being afraid of technology, especially in the classroom, shouldn't be. If you want the students to talk to each other." Chris viewed the migration to teaching with student-devices as an opportunity to integrate the technology into his teaching objectives:

> So I never had connected devices be a negative aspect of my teaching style. For me, we were able to use the devices as even props in a theoretical based discussion. If you have your computer, how are you going to secure it against his on the same Wi-Fi network or something like that. The connected devices ended up being a tool for that collaboration.

Other participants considered their migration into a BYOD-culture as a challenge to their traditional instructor-led teaching preferences. When asked about the initial impact of student-device use in his classroom, Anthony's neutral response on the questionnaire was more

pessimistic in his interview: “No, in fact, if there is anything that was an impact, it was negative. And it was negative because I had to tell the student, close that. I want you to listen to me right now.” Jason’s interview response correlated more closely with his neutral questionnaire reply: “I guess to tell you the truth, it’s not made much of a difference.” During his interview, Frank echoed Jason’s experience and offered additional detail related to student collaboration:

> The student device, I believe, removed some of that interaction with the student. If you think about it, historically, the instructor’s up in front of the room and they’re teaching, and they are interacting with students, and if they’re teaching really well, they’re questioning the students and they’re reading facial expressions and they’re really making sure the students are involved with the material. The problem is, that’s not where all the learning happens. Certainly, the student has to interact with the material, but in order for them to make it their own, there has to be that discussion. They have to interact with someone else and mull it over.

Similarly, Luke was agreeable to teaching with computers on the questionnaire and in his interview, while also while pondering how to continuously improve the students’ learning environment:

> I honestly feel that the way that we teach now is really, really great. As far as it being better than it was before, I think to truly get the best type of student out, we might need to look for areas where we could maybe work a hybrid system where some of it is still instructor led. And some of it is still group collaboration or student focused, where they have free reign to teach themselves.

In a subsequent focus group, Luke's comments also served as a summary of the sentiments offered by many of the participants, whether their initial preferences leaned toward instructor-led or student-centered BYOD classrooms:

> You as the instructor, teacher, to get knowledge across then you have to try to get them, you know, to pull in to it and invest in what they're trying to get knowledge on. I think it's funny that as we're talking about how we're changing the way that students are taught and you know, technology progresses, that there's still some of those stigmas that will always remain.

Student reactions. By the time they enter the military training BYOD environment, most students have recently completed their basic enlisted military training, while a smaller number are retraining from previous occupational specialties as active duty, guardsman, or reservists. Instructors' comments regarding student reactions to the BYOD learning environment were mostly positive in the questionnaires, interviews, and focus groups. There was mild dissention indicated on the instructor questionnaires when participants were queried on student preferences for teacher-led or computer-led instruction. During his interview, Frank shared his perspective on student reactions to the BYOD-environment:

> I see students outside of the class even on breaks, they'll be in the hallways, and they'll be talking about a piece of material they just read or a project they just finished, so I see them picking up and talking amongst themselves, and I relate that to the change in the environment [to BYODs].

Edward's comments on student reactions were more succinct in the first focus group session: "The students loved it because I made it so interactive. They were always out of their seat." This positive experience was repeated by all participants who agreed with the questionnaire inquiry:

"Computer use suits my students' learning preferences." Luke extended students' positive reactions by speculating in the third focus group:

> Well, I think as far as bring your own device goes, I agree that my personal view is that it is a good thing. Not only from the monetary standpoint, but also like the emergent leader and the team building concepts, just it lets the student be a little more freer to express themselves.

The construct of student freedom through device use was extended by Ian's interview comments: "It really opened up . . . It just allowed that time for us to just talk, and they would talk to each other just as much as I talked to them." Daniel was more specific, describing student freedom found in an "active learning environment" in which students not only used their devices in class but also continued researching outside of class and returned with contributions to share with the rest of the class. Chris added in his interview, "So, what I saw is that when students were able to use their devices . . . it broke the barriers of communication for them, because there's some students that don't want to speak out loud about things."

The instructor questionnaire also captured participants' perspectives on student preferences for either teacher or computer-led instruction. Responses to the statement, "Students prefer learning from teachers to learning with computers" were more diverse than the statements offered in the interviews and focus groups. While most participants disagreed with the statement, there were also some "neutral" and "agree" responses. Of those who disagreed, Jason stated,

> But for the group paced block, does it help with collaboration? Definitely, the students have that computer in front of them with all the course material throughout what they've

> learned. I teach the latter half of the blocks so they get availability of all of course material. So they can show their peers and collaborate with peers.

George mirrored those sentiments in his interview:

> By giving that [BYOD], it allowed the students to share ideas more easily. It allowed them the freedom to get ahead of their material, and talk with, "I was reading this. What do you think?" They would start talking amongst themselves. At first, it didn't really help a lot with the discourse between the instructor and the students. It was really a benefit between them, 'cause they would sit there and compare notes. They could do a quick find for somebody who had a question.

When referring back to the questionnaire inquiry on students' preferences for teacher-led learning, it was only Anthony's interview comments that correlated with the roughly third of participants who agreed or were neutral on the questionnaire. Unexpectedly, his comments emphasized not the presentation medium (instructor or device), but rather the challenges of viewing text on a screen compared to hardcopy material:

> We remember the geography of the page, not just the data. When we read from an electronic format we lose some of the dimensions of that geography. You might remember how far into a book you were when you read something. It was approximately that thick on the left-hand side. You lost that dimension of it when you're reading it on a Kindle and you're just flipping electronic pages.

While participants' experiences contained some variation regarding students' responses to entering the military training BYOD environment, the majority of their statements indicated positive experiences as indicated by the consistent use of similar descriptors, such as "active

learning" (Daniel), "broke barriers" (Chris), "share ideas more easily" (George), and "grasp the concepts better" (Luke).

Empowerment. Military instructor experiences with students' BYOD connectivity focused on a shift from their previous teacher-led classroom traditions to student-centered learning environments. While assigned to a BYOD environment, the participants experienced varying degrees of student connectivity in their classrooms. Depending on the timing and location of their teaching assignments, student connectivity may have been constrained to an isolated intranet, or may have included a Learning Management System (LMS) Instant Messenger (IM) capability on an intranet, or may have been a combination of intranet and internet capability in a schoolhouse student break area. In all cases, however, students had full internet access within their dormitories outside of school hours, which instructors leveraged for student research and assignments.

When reflecting on student-teacher and peer interactions associated with the use of BYODs, Luke commented in his interview:

> With the bring your own device and small group conversations, that gives them a little more free reign to interact and bounce those ideas, so you really start to see some of those intangible things that can't be taught, like team formation theory come in to play earlier rather than later.

George also described the environment in similar terms, "It's a student-centered learning, which allows the student to progress at their own pace through the course. Which in itself also initiated some more discourse. . . . They would discuss more because you get a little bit of a competition." When participants' experiences included the students' use of an LMS IM application, Frank commented during the second focus group:

> They were able to submit questions to me without having to bother their peers, or have a direct conversation with me while they were working on something. They could flag questions on a test so that we knew they needed help, [and] they could go back and look at them.

Other participant interviews described student empowerment as when the "student's in control" (Ian) or when the students "share what they had discovered" (Harold) and [they] "were able to share that information" (Daniel).

To further illustrate the manifestation of student empowerment in their classrooms, some of the participants were more comprehensive in their examples. Daniel offered in his interview,

> What we find as instructors is, as we're lecturing, they're utilizing their device and they're taking notes, and highlighting whatever it is the material that they've got. But we also find that some of them would go back to the dorms and look up some of the information, and bring back something that relates to that particular topic. Which is great.

During his interview, Ian shared that the student devices not only enabled collaboration on the subject but also facilitated his students' pursuit into parallel topics. While Luke, George, Frank, Ian, Harold, and Daniel were the most prolific in illustrating their experiences with how BYODs enabled student-centered learning, these sentiments were also supported by broader agreement in Focus Groups 1 and 2 by Anthony, Bryan, and Edward. When asked during his interview to reflect on his experiences relating to how student empowerment was propelled by the BYOD in his classroom, Ian's comments described the participants' collective feelings:

> They [students] wanted more than we were able to offer, at times. They wanted more information than the lesson plan would allow us to talk about. They wanted more than what the military wanted us to teach them. When BYOD came into effect, it really

opened up the possibility for them to bring all those resources into the classroom, and even on breaks we would see them talk about certain technologies.

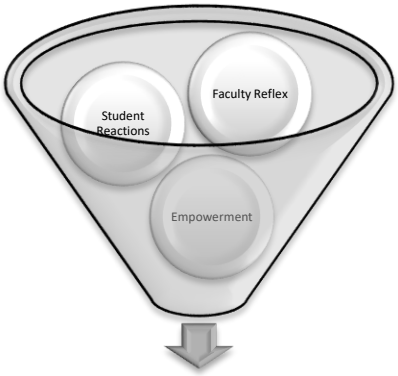

Figure 1. Data analysis uncovered three subthemes —student reactions, faculty reflex, and empowerment—which joined together to form Theme 1: Adopting a BYOD Culture.

Theme 2: Student primacy. Traditional military occupational training instruction is principally an instructor-centered delivery design consisting of a programmed delivery and scheduled break times. As indicated in the theme of Adopting a BYOD Culture, a byproduct of this instructional design is the subordination of instructor-centered to student-centered instruction. Reverberations of student primacy surfaced throughout participant questionnaires, interviews, and focus groups along three subthemes: engagement, subordination, and rapport.

Engagement. When the participants were hired or transferred into a course or program that employed student BYODs, their experiences in remaining engaged with their students were common, yet contained variables. The data collection began by using the questionnaire, which provided an initial glimpse of participants' attitudes regarding the use of computers as instructional enhancements. About two thirds of the participants agreed with the questionnaire statement: "Using computer technology in the classroom would make the subject matter more interesting." The remaining participants who did not agree with the statements recorded their

response as neutral. When participants were asked in interviews and focus groups to describe the impact of student BYODs on classroom collaboration, the subtheme of engagement began to emerge.

As the subtheme of engagement unveiled, participants' descriptions of their experiences emerged into two categories: degrees of instructor-student engagement and instructional techniques used to engage students in various situations. The participants agreed that engagement remained an important component of the student-centered classroom despite the use of student-BYODs. Chris described his perspective in this manner: "The reality is, every instructor should be able to bring their own piece to it, should have their own spin on it, to liven it up and make it more of an interactive type of event." Kevin continued in his interview, "So the way we're doing it with the self-paced is, you really have to get yourself more involved than a regular classroom because you have to kind of treat them more individually than you do as an entire group."

The instructors experienced student engagement in varying intensities while assigned to BYOD classrooms. Of those participants who reported reduced instructor-student collaboration, those instances occurred while assigned to team-teaching duties. Speculation on their peers' paradigms which contributed to lower levels of student engagement included Ian's comments in the third focus group:

> They're not [functioning as] facilitators, and they're watching the students use these devices all day. You have to be careful, because some of these instructors think, "Well, I don't have a job." Which is absolutely the wrong case, because your job has now just become harder, because you need to be more knowledgeable, you need to be more into the technology to see how these students are moving along.

Frank, who responded as “neutral” on his questionnaire to whether using computer technology in the classroom would make the subject matter more interesting, commented that he was not able to correlate computer technology, instructor age groups, or a desire to remain engaged with their students:

> So, I don’t think it’s necessarily a generational thing. I really can’t explain it. But, those types of instructors are interacting just as poorly now, even though we’ve changed the environment with the devices, as they were in the past. The device hasn’t made the situation better or hasn't made it worse as far as [classroom] discourse. Some instructors are just allowing the students to read the material. If the student has a question, the direction is, well, go back and read the material and see what it says, because it’s there in the book, just read it.

During his interview, Bryan shared a peer teacher experience which amplified Frank’s comments:

> The [other] instructor obviously had little to no interaction with the student because they let that student run and take the test. He failed so he’s counseled. He’s supposed to be given a little bit of [individual] assistance, however, they did not give it to him, they just said, “Well, it’s an easy module, you need to go spend more time on that,” was the judgment call. [The student] growled and went and sat back down, clicked through his first module again, failed the test again.

Unpacking the possible rationale for an instructor’s reluctance to robustly engage students, Taylor, who was also “neutral” on whether using technology would make the subject more interesting to students, offered an unexpected perspective during his interview:

> Nowadays, [students are] more expected to get frustrated if they don't understand it right away. I'm like, why did you [not] read your directions? The problem that keeps occurring is the students don't read the directions that's right here. Now, let me point to it. Let's read the sentence together on your screen.

Regardless of the frequency and intensity of instructor-student interactions in a BYOD environment, participants believed that engagement requires a deliberate approach, as described by Kevin in focus group three:

> Most of the time, with the self-study, it's almost like a quiet environment and you try to engage them, and there's times when they're really receptive to it, and there's times when they're just like, "I'd rather be studying and left alone." It's a mixed bag.

Several of the participants reflected on the need to individualize an approach to student interaction. Harold offered,

> Once students come in the door and they're at a certain level higher than the other people and you gotta shift gears in the middle of class around working with one student, and then gotta go back over and help with another student, who is not as far along.

Finally, George's remarks in the second focus group served to summarize the need to customize engagement to the individual student when he stated, "The struggles that somebody is going through really helps me to understand what can I do to make their life a little better, make their life a little easier [in the classroom]." The participants' experiences with student engagement in a BYOD environment were consistent across the interviews and focus groups. There was also alignment between those engagement experiences and the participants' attitudes on whether computers made the subject more interesting. While military instructors agreed on the

importance of student engagement in a BYOD classroom, they practiced it at different levels of intensity.

The learning environments experienced by these participants was student-centered and self-paced, and the instructors revealed similar techniques (in the interviews and focus groups) toward engaging their students. They began by focusing on an individual student and then widened their aperture to collaborate with the rest of their class. The instructors described their approaches as, "You try and interject yourself into it" (Kevin), "just you and me. One-on-one" (Chris), "engage [the class] to make that logical leap" (Luke), and "an opportunity to talk the group as a whole" (Ian). Questioning techniques were often cited as the most common catalyst to sustaining student engagement, as described by Daniel during the first focus group:

> But basically, redirect one student's question to that individual that's not being participative, in hopes to try and drag them into a conversation. . . . You want to be reasonably well assured that they're going to pass that quiz that they have to take. But you can't do that if the student's not engaging.

George's comments during the second focus group were similar; however, his approach leveraged individual questions to draw other students into a classroom exchange of ideas.

> I would ask them their questions. I'd pit them against each other. Not in a, "Let's be mean to each other." I'd be, "What do you think? Do you agree with him?" I would get those two talking. When you get two of them talking, then some other ones are listening. They're like, "No, wait a minute, now. Wait a minute, now."

During the third focus group, Luke explained that he combined individual and group questions with the use of visual aids in his pursuit of proactive engagement:

> If it's a concept that several tend to struggle with and I'm discussing it at the board, then the majority of the class will be paying attention . . . you have that domino effect of where one person might be afraid to ask the question, but once that subject is broached. . . then it's almost like the floodgates kind of open. And everybody wants to have their question answered . . . and they've realized that, "Wow, I'm not the only one."

Kevin continued during the third focus group,

> See, some people don't like to ask questions, they don't want anybody to think they're dumb. . . . But when they do ask a question, or you start doing something on your own up on the board or start talking about the classroom, then, "Oh, could you help me with . . ." Then they'll put their hand up to come over there and just show me something or, "What does this mean?" . . . But they wouldn't ask. Because, a lot of it is the peer pressure thing. "I don't want to appear to be stupid."

While the participants offered varying techniques they used to achieve and sustain student engagement in their classrooms, their comments also signaled a universal agreement that students remained the catalyst to a productive BYOD learning environment. Edward shared, "You're always slowing up and getting that conversation going with them to make sure that they understand what's going on, make sure they're staying with the material." When commenting on the efficacy of BYODs in a collaborative environment, Chris stated, "I'd say the interaction with the students was probably the best. It's the most real you're going to get." Anthony was more succinct: "An effective classroom instructor is as engaged with his adversary as a frontline in battle."

Subordination. The participants' experiences within a student-centered BYOD environment differed from their practices when previously assigned to schools which employed

instructor-led curriculum delivery. Within teacher-led environments, they were responsible for the group-pacing of learning activities, which was limited to the rate of the slowest progressing students. Instructors controlled the lectures, discussions, demonstrations, and group-based activities within the framework of an eight or nine-hour daily schedule, with an average of one programmed break every hour. After their assignment to a student BYOD-enabled course or program, the instructors' responsibilities for students' acquisition of skills, knowledges, and abilities remained the same, yet their daily classroom roles changed.

As I made subsequent passes through the interview and focus group data, the participant experiences began to form the textural subtheme of instructor subordination as an abutment to the student primacy theme. Subordination emerged from participant descriptions of their transition from declarative subject matter experts to student-centered learning and life-guides. In their interviews, participants described their student-centered roles as follows: "I like to share stuff with students" (Kevin), "role [in] who they're going to be" (Luke) , "it's about helping them grow" (Frank), and "watching the lights come on" (Daniel). During his focus group discussion, Anthony characterized his subordinated instructor role in a self-paced learning environment: "I am a student of the people that I am talking to."

After transitioning into a military student BYOD environment, Chris found himself practicing deliberate humility to align with the student-centered classroom culture:

> We need to be humble in our approach as instructors, to give these students the ability to stretch their legs and really run with the capabilities they have. I think one of the biggest eye openers for me, and I know I've talked to all of you gentlemen in the room about is, for who knows long, we have severely underestimated the students.

In his interview, Frank echoed the same sentiments, describing his realization that the students could effectively explain concepts to each other in the "their own language."

Instructors who deliberately subordinated themselves to student-centeredness also indicated their acceptance of student-owned technologies within their classrooms. The instructor questionnaire was used as an initial data capture to assess instructor attitudes on the use of technology as instructional enhancements. Two questionnaire statements helped triangulate the data between the interviews and focus groups concerning a BYOD-use relationship with instructor subordination. All but one participant agreed with the first statement: "Computers can enhance student learning." In a later interview, Kevin, the participant who disagreed with the statement, reflected on his reservations:

> Oh. It's a mix. I find it has been rewarding and then challenging because we've been doing this shift over from the regular classroom of standing up there and talking to the PowerPoint, and here are the questions and give me the answers and so on. It's a challenge in that we've now . . . We're moving on to this new, kind of, way of doing it where it's all self-paced. So, you have to really be flexible.

Referring back to the questionnaire, the second technology-subordination related statement was more abrupt: "Computers have no place in schools." George, the one participant who agreed with this statement, later clarified in his interview: "I'm of the mind it doesn't matter to me when the students learn the material, how they learned the material. My concern is that they learned it, and that they can demonstrate to me they understand."

The data analysis unveiled general participant agreement on how instructor subordination serves as an impetus for student primacy within a military BYOD classroom. By releasing his grip on classroom control, Chris reflected in his interview, "There were times that I was in class

that I really didn't have to do a whole lot. I was able to sit back and watch just how brilliant some of the minds we have." Anthony added in his interview, "The ability to shape, mold, influence and grow the next generation of people in your career field is the best, period, hands down." When summarizing his experiences following his transfer to a military BYOD environment, Luke offered a more personal perspective on instructors' subordination in pursuit of student primacy:

> I have students ask me, "Why didn't you go on and get a better job, do things for more money and travel and this and that and the other?" And I tell them, "It's because of you guys. Those extra zeros and that travel that I don't get in some other job."

Rapport. As the theme of student primacy continued across the data, the consistent subtheme of student rapport also appeared. To unveil any relationship between student devices and instructor-student rapport within the participants' experiences, responses to the questionnaire statement, "Working with computers does not diminish people relationships with one another," was integrated with interviews and focus group responses. When correlating the comments between the interviews and the focus groups, participant experiences included an emphasis on the importance of establishing rapport with their students, as related by Luke in the third focus group: "So you're [instructors and students] learning from each other. It's more of a symbiotic relationship. Since you're having to adapt to them, and they're having to adapt to the military style and learn the knowledge that you're passing on." Chris added, "I think that's the goal of being an instructor is to have a positive impact on the students you teach." In the second focus group, Frank described the importance of rapport: "These young people coming through and I have some pity for them because they're 18–19 years old and they're scared to death. And I like to encourage them." Other comments on pursuing rapport in the classroom were centered on the

internal rewards which instructors received from collaborating with their students, as described by Ian: “So, it’s been rewarding and the fact that, for me personally, Wow, I guess I did make an impression on at least one or two people. That’s pretty cool.” Daniel continued, “So, it’s been rewarding in that, I have met a lot of different people. People from all over the country of all different ethnic backgrounds, social background, educational background, and it’s been very rewarding.”

To further examine this subtheme, the questionnaire responses were contrasted between the interview and focus group data to determine if there was a relationship between participant attitudes about computers diminishing people relationships and instructor challenges in gaining rapport with students in a BYOD environment. Forty-two percent of participants agreed or strongly agreed with the questionnaire statement that computers do not diminish relationships, with 42% disagreeing, and 16% neutral on the statement. Of those that agreed, their comments in both the interviews and focus groups indicated that rapport was not affected by the BYOD environment, but remained problematic in the teaching-learning environment. In the interviews and focus groups, participants used words such as “a challenge” (Harold), “difficult” (George), “the hardest” (Chris), and “gotta deal with [it]” (Kevin) to describe their experiences of developing student rapport.

Those participants who felt that computers do not diminish relationships in a BYOD environment also offered more detail in describing the barriers they faced in establishing rapport. In the second focus group, Harold stated that class size and time challenged his rapport with students:

> Inside the classroom that’s difficult to replicate on a large scale for 12, 24 students at a time. You can’t do that, so turning that type of . . . That organic learning environment

> that one on one environment into something successful in the classroom was always a challenge for me in the beginning . . . I think that was my biggest challenge, is finding a way to multiply that one student interaction across the whole class.

Edward's interview comments paralleled similar concerns of class size and time with an added contrast to his experience in public education:

> Every five days you get a new fresh set of faces, and having to make those kinds of transitions, learn a new bunch of students all over again and then in five days later they're gone. In public school I could have a long term educational relationships with these kids. Some of their families knew what they liked, what they didn't like, what their strengths and weaknesses were and I could kind of play on that in the educational setting.

In addition to the external contributors to challenges in developing instructor-student rapport, Anthony offered an unexpected experience related to instructor personality types:

> Studies have shown that some of the most effective instructors are introverts because we build quick with our audience. It may drain every ounce of energy out of us but we build quick with people in order to communicate with them . . . an extrovert tends to focus on shallow interactions and doesn't necessarily engage to make sure that the message is getting across.

For the remainder of participants who disagreed (on the questionnaire) that computers do not diminish relationships, their interview and focus group comments expressed that instructor-student rapport was affected by the BYOD environment. Kevin disagreed that computers do not diminish relationships, yet made comments that traversed both the non-BYOD and BYOD-related challenges to instructor-student rapport. His initial interview dialogue included a focus on individual student impediments such as "personal problems" and "difficulty dealing," which

presented as unrelated to BYOD. At a subsequent focus group, Kevin's comments echoed the same idea, yet offered more granularity to indicate causality as the self-paced BYOD environment:

> The downside of that is, you don't have as much time with the self-study. I'm the kind of man who likes to get to know people to a certain degree. Where, you know, I know in the old way I would ask all the students at once. I'd find out where they're from, where they're going, what kind of family life they had, and so on and so forth.

There was also alignment between these comments and Kevin's questionnaire response when he disagreed with the statement: "Computers do not diminish people relationships." Within the same focus group, Luke's description of BYOD-related challenges to rapport were congruent with Kevin's comments: "We're having to adapt our communicative styles to the students based on their individual understandings, versus the traditional method of just an instructor-led type of instruction and hope that they get it."

The components of the instructor-student rapport subtheme were more diversified than the other subthemes reinforcing student primacy, yet the importance of rapport remained unified within participants' experiences. Instructors believed that rapport was a catalyst to an effective learning environment while remaining a challenge to establish and sustain. When considering the causality to challenges of developing rapport, the participants cited various contributing factors, both personal and external.

Figure 2. Data analysis uncovered three subthemes —engagement, subordination, rapport— which joined together to form Theme 2: Student Primacy.

Theme 3: BYOD instructor attributes. When the BYOD environment began to unfold within their schools, or after the study participants were assigned to military schools which employed student devices, the participants were confronted with profound changes in their well-developed teaching methods and practices. As discussed, these instructors transitioned from instructor-led to student-centered learning environments. That environmental change challenged the study participants, who were initially expected to control the time spent on each objective, mediate the amount of student collaboration and discourse within the classroom, and the regulate students' pace through the course. The BYOD environment requires that instructors evolve to share classroom control with their students by transforming from classroom leader to facilitator. This conversion required instructors to defocus on collective class dynamics and converge on individual student needs and abilities, since learners were now progressing at varying speeds. The participants' responses to gaps in student learning shifted from proactive and collective to reactive and interventional. When confronted with this inversion in instructor-student relationships, several of the participants in his focus group agreed with Frank's interpretation of their options: "There are three things that an organism can do: It can adapt to a change in its environment. It can move to a new environment. Or it can die." While none of the instructors believed that death was a plausible alternative to a student-centered BYOD environment, several participants did witness peer-teacher resignations or retirements in lieu of adapting to interventional instructional methods.

While analyzing responses to the questionnaire prompts, interviews, and focus groups on the teaching impact of BYOD-use, the subthemes of adaptation, passion and commitment, and critical thinking emerged consistently across the study instruments, leading to the overarching theme of instructor attributes. The participants were consistent in suggesting that the pathway to

adaptation began with passion and commitment for their occupation, and was followed by critical thinking to energize the improvement of the learning environment. While instructor passion and commitment were not specifically assessed in the questionnaire, 58% of responses to "computers will improve education," and 75% of responses to "computers fit well into my curriculum goals" were marked as "strongly agree," suggesting a positive emotional component to their reply.

Passion and commitment. During the interviews and focus groups, the participants were asked to describe the motivations which inspired their pursuit of becoming an instructor. Eighty-three percent of their responses included the multiple uses of the words *passion, enjoyment*, or *appreciation* when describing their teaching experiences in general terms. Anthony was more descriptive: "I could sell organs and parts of my soul, if they found [me] a [teaching] position. It's quite simply the best job." When chronicling their passion to teach, several of the participants moved from a general to specific context. Only one instructor, Chris, linked his desire to teach with the emergence of the BYOD environment within his school: "You have to have the passion to make that change. If you don't have that passion . . . you ended up like some of our other instructors . . . they choose to retire." Other participants found inspiration within their student interactions. Kevin mentioned, "[It] isn't just about the equipment, it's about helping [students] grow as people and as citizens." Ian continued, "The different conversations I had on a daily basis was probably the most valuable thing I had." Finally, Jason, one participant who shared his enthusiasm for teaching, was paradoxically less interested in the students than he was the technology which he taught:

> I love technology, so anything they bring online I get to play with. I'm kind of biased on like, Hey, sure, let's bring it online. I know the students probably [won't improve] their

> learning process. Probably won't be enhanced. I want to play with it. So let's try and try doing this and seeing how it works.

As the participants described their passion as the catalyst teaching within the BYOD environment, they operationalized that inspiration thorough a commitment to constant improvement of themselves and their learning environments. During his interview, Chris summarized the role of commitment in the first focus group: "If we don't provide the best that we can, then we're already failing." Other participants illustrated commitment as "dedication," "the extra mile," "making an impact," and "pride in what they do." In most cases, the instructors' experiences included the association of time with commitment. George, Frank, Luke, and Edward emphasized the importance of continuous research, often after hours, to obtain answers to student inquiries. Kevin echoed that commitment includes continuous research toward better student outcomes: "You find yourself hoping you're teaching well enough that these students will have enough of the tools that you've handed to them." When discussing teacher passion and commitment, as in other data themes, Anthony offered a more concise perspective: "An effective instructor has to work at it."

Adaptability. Adaptability was the subtheme which emerged to support the participant-instructor in achieving and sustaining alignment with the present state of the BYOD environment. In contrast, the subtheme of critical thinking (in the following section) supports the instructors' pursuit of their evolving desired state. During the data collection phase, the study participants used forms of the word "adaptation" on 93 occasions across the interviews and focus groups. The attribute of adaptation was manifested through the deliberate decisions made by the instructor to align with his individual students and the BYOD environment. As with several other subthemes, the participants' experiences were common across the data while

remaining specific to the individual. Adaptation revealed across three codes of experiences: transitional, improved teaching skills, and alignment with learner needs.

The participant questionnaire solicited information on participant attitudes about using computers as instructional enhancements. During the data collection phase, 58% of participants strongly agreed with the questionnaire statement: "Computers will improve education." The remainder (five of 12 respondents) who did not strongly agree indicated that they agreed with the statement. The prompt was stated broadly enough for participants to signal their acceptability of incorporating the technology into their teaching practices. Unexpectedly, several instructors who strongly agreed on the questionnaire also described their initial disagreement about sustaining collaboration in a student-centered classroom. In his interview, Daniel reported,

> We were anti-device in the classroom. It would detract from learning. It would prevent me from pushing this material out to the students, in a timely fashion. I mean, the list was a mile long. But it sure proved itself wrong, once we adapted and we learned the benefits of that technology in the classroom.

Bryan, who also agreed with the questionnaire statement, described the reluctance of peer instructors to adapt: "When we rolled out the student centered learning, the initial [instructor] reaction was absolutely no interaction [with the students]. It's they'll work on it alone, if you fail, you fail, I'm not teaching you." George concurred by adding a peer observation: "We have to adapt. We had one individual that he just, he could do it, but he didn't want to do it. He wanted to stand up there and lecture at the students all day, so he moved on." In the first focus group, Anthony shared his experience witnessing the adaptation challenges of newly hired peer instructors: "The older crowd that I find we're on that right now is that's the biggest push, to either not adapting at all or having a very difficult time adapting." The remainder of participants

who agreed that computers will improve education contrasted their questionnaire response against interview and focus group descriptions which ranged from initial reticence to determined reluctance concerning their willingness to adapt to their BYOD environments. When reflecting across their personal timelines on their past experiences with adaptation, the participants' responses became unified in their perspectives on military student BYOD-use, represented by Daniel's statement during a focus group discussion: "As you start gaining feedback from the students. And you see the active learning take place across students, and you realize, 'Wow, I could present more material to caveat what's required and make this a better block of instruction.'" Edward was more circumspect about instructor adaptability across BYOD classrooms: "I guess my experience in the classroom, we need high-quality instructors. We need motivated instructors. We need people that don't resist change."

The interview and focus group data exposed not only the value which participants placed on the attribute of adaptation, but also its reciprocal impact on improving their teaching skills. In general terms, Luke commented that "with the adaptive communication style, it has the added benefit, I think, of making the instructor a better communicator as well." Chris' interview comments were similar, "It meant that not only were they going to learn something, I'm going to learn something, and then I'm going to be able to project that to them. So it was great." During his interview Daniel observed, "I've had to adjust my way of teaching a little bit, to encourage more note taking and more use of their technology in the classroom." Anthony concluded during the first focus group:

> An effective instructor has got to be somebody who can think on their feet, who continues to grow in their knowledge of their course material, their subject matter . . . who is able to adapt at a moment's notice to the situation in the classroom.

As I made several passes through the data, I ruminated on the question, "If the participants' value adaptation because it improved their teaching skills in a BYOD environment, were they seeking to achieve anything else?" At the confluence of that question and the student-centered environment surfaced the instructors' desire to align with students' individual learning differences. The data indicate that the participants' pursuit of this alignment contrasted with their previous experiences within instructor-led classrooms. Their new BYOD environment required them to perceive students as learning individuals, instead of discerning them as a group of learners. Kevin described his experiences of correlating with students' personal learning styles in the third focus group: "We have to adapt our teaching style almost every day with different students, because each of them is an individual." Luke continued,

> The different personalities between the students and having to tailor your responses to them, both not only so that they can understand it, but also to where they are in any given block, throughout the day, is absolutely a challenge.

Edward's statements reflected a similar perspective when recounting his return to the military teaching environment from the public school system:

> This timeline is totally different in that I have to adapt individually [to the student], sometimes as a group, but a lot of times it's an individual thing. So the adaptability part, to me, is being flexible, and shifting my gears all the time.

Continuing the comparison between participants' agreeable responses to the questionnaire statement, "Computers will improve education," and the focus group and interview responses provided additional insight into instructors' perspectives. While adaptability within the BYOD environment was important and facilitated growth, the data also suggested that participants did not subordinate their responsibility to the technology, but rather leveraged the

devices to align their teaching methods with student needs. Jason emphasized that his teaching approach was principally focused on developing characteristics such as "self-reliance" and "student capability." Chris's goal was to teach "using those devices they are learning with, to actually doing the hands-on [skills]." Frank, Harold, and Ian also adapted to student needs by leveraging the devices instead of teaching through the devices. They did not use the devices as a pathway to meet student individual needs, but instead retained them as a media to support that adaptation. The participants also offered no standard guidepost for how they continuously modified their teaching methods. Like the students they teach, their approaches were individual and included "mentally adjusting [to the student]" (Ian), "student interpretation" (Harold), and "[meeting] student intent" (Frank). Using an uncomplicated description of adapting, Kevin stated, "You may not be happy about it but you jump into it and do it till you get it figured out. So, to me, I see it as an ongoing fluid-type environment."

Critical thinking. As stated previously, the student BYOD environment within military training necessitates the migration from passive to active student learning. The traditional teacher-centered lecture method does not encourage active learning or critical thinking since the topics are discussed sequentially and students rely on memorization rather than application (Duron, Limbach, & Waugh, 2006). Within the military student BYOD domain, the participants' experiences included leveraging the technology toward the desired state of an active learning environment. Edward explained,

> That's a collaborative trick, so to speak, that I always loved, but you had to have the devices in the classroom to make it happen. Whether it's a lab exercise, or whether it's a stand-up lecture, you want to get the students involved, and you want to get them interacting with each other.

All of the participants offered comments which collectively supported the subtheme of critical thinking as one attribute of a teacher who practices within a BYOD environment. The participants' critical thinking experiences emerged in three codes: the instructors' critical thinking, encouraging students to think critically, and applying critical thinking to improve the learning environment.

In addition to interview and focus group discussions, the study questionnaire made inquiries regarding instructor attitudes on using computers as instructional enhancements. Specifically, the participants were asked if they agreed with the statement: "Computer use fits well into my curriculum goals." Seventy-five percent of the participants strongly agreed with the statement, 17% agreed, and 8% were neutral with the statement. George strongly agreed and later reinforced the sentiment of instructors' critical thinking skills during his interview: "Bringing that technology into the classroom enabled the instructor to say, Well, you know what? Wait a minute. Let me go google it. Let's read it together and figure it out." In the first focus group, Chris, who also strongly agreed with the questionnaire statement, reflected, "The reality is, every instructor should be able to bring their own piece to it, should have their own spin on it, to liven it up and make it more of an interactive type of event." Collectively, the participants believed that in order to facilitate the critical thinking skills desired of students, they had to "practice what they preach" (Chris) "rather than just describe [the subject]" (Daniel). Participants felt that instructors should prepare themselves to present "complex thoughts" (Luke), be "well-versed" (Kevin) and "smarter" (Edward) in their subjects toward the goal of "reinforce [ing] fundamentals" (Ian) for their students.

The participants were strong proponents of developing methods to encourage students' active engagement with their subjects. They believed that a student who is actively engaged in

learning will develop the ability to analyze and evaluate information. In lieu of an instructor-centered presentation, Daniel encouraged students to investigate the material, "The ones [students] who do some investigation are the ones that are fast burners, or really want to learn." Additionally, Daniel noted in his interview that those students who "shared those resources" with the class, rather than "just describ[ing] it to me," were his highest performers. Harold also commented on the value of student research and investigation:

> So the fact that this student went out, found something, downloaded it on their own personal device, and then they were able to bring it in and share what they had discovered and tell other students, hey, here's this program. You get to play with it. It's free. And that was kind of awesome.

Ian continued the same line of thought in his interview: "BYOD, in my opinion, as far as technical instruction, it allowed them to bring resources that they had found, and we can then utilize those to reinforce fundamentals."

While purposefully incorporating student investigation into their teaching methods, a few of the participants also mentioned secondary benefits to insisting that the students share their discoveries. In presenting their findings to their military classmates, the instructors unveiled student dynamics including "emergent leader and team building concepts, it lets the student be a little more freer to express themselves" (Luke). Luke summarized active student learning techniques in the third focus group: "I honestly feel that the way that we teach now is really, really great." Edward concluded, "To defend our country, [our students] have to be smarter than the enemy. That's why we're here, right?"

Thus far in the data collection across the three instruments, the study participants agreed that computer use fit well into their curriculum goals through innovative application of student-

owned devices. These innovative applications were inspired by the instructors' individual yet unified methods developed through the use of critical thinking. The teachers uniformly valued the application of critical thinking within themselves, their students, and finally within the teaching-learning environment to support both the instructors and the students. While the participants did not experience their BYOD environments within the same timelines or the same training modules, they shared the subtheme of critical thinking inspiring improvements to an active learning environment. Frank reflected on the instructors' critical assessments which inspired the initial transition to a BYOD environment:

> The more we questioned, the more we kicked that football around a little bit, and the more we decided, okay, we're just going to try this. We're not violating policy. We're just doing things a little differently, and it was really baby steps at the time, but it really led us to where we are right now.

Throughout the individual interviews the participants shared how they leveraged critical thinking to form an iterative process toward establishing a BYOD environment with the initial focus of easing the burden on the instructors. George explained during his interview,

> [We] used e-readers to get the students to read the material as opposed to printed documents. We went with that because we could do wireless in our network, and that allowed us to freely update one place, and then everybody pulled down from there. Updating the material was much easier, much quicker dissemination to the students.

Harold described how the instructors continued to focus their technology on students,

> We're like, well, why don't we just build a student LAN, a student network, publish it over the Wifi and then we can put webpages up with the student text on there . . . And that was a really quick and efficient way to deliver the material.

Daniel's later experience in extending the BYOD environment was positive: "It just made things a lot smoother, a lot speedier. It allows me to share that information that I'd like to share to my students, which is extremely valuable these days."

Although the participants delivered different training across different timelines, their experiences of how critical thinking energized the improvement of the learning environment were common. During his time as an instructor, Chris was always seeking a "little bit of leeway here and there, looking for opportunities," while Frank pursued used equipment to "build a little network that students could play with." Ian's comments regarding his instructional role in the BYOD environment were similar: "Nobody instructed us that this is where the future of the course is going, but we just kind of went that way, with the technologies that we experimented with." Finally, George's comments in the second focus group served as a summary for the collective participants' experiences of how critical thinking influenced the student BYOD environment:

> It sprung out of an idea of there's got to be a better way to do this. All along up until we got to student BYOD and Web delivery of the material, we hadn't really done anything but change the media. We hadn't changed the instructional environment, the educational environment, the classroom. I think it was the combination of the web delivery and the students centered and the BYOD, all coming together that really fostered that change in the classroom environment.

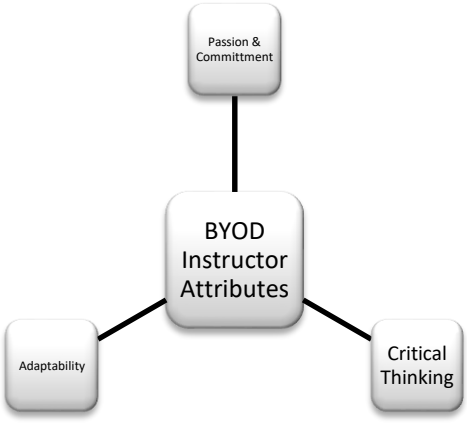

Figure 3. Data analysis uncovered three subthemes — adaptability, passion and commitment, critical thinking—which joined together to form Theme 3: BYOD Instructor Attributes.

Theme 4: Learner ownership. Some of the study participants experienced a migration from instructor-led classrooms to students' BYOD-use, while others were assigned to courses which had previously incorporated BYODs into their lesson delivery. In both situations, the instructor experiences were both unique and common: they were confronted with profound changes to their well-developed teaching methods and practices. The questionnaire, individual interviews, and focus groups all revealed experiences which emerged into the theme of Learner Ownership. As described by the participants' experiences, the implementation of BYOD within their courses inspired a pathway to democratic classroom practices which included student inputs and decisions on the sequence of learning objectives and the self-pacing of instruction. Within the BYOD delivery method, military students now employ a greater sense of control and possession of their learning process, hence the use of "learner ownership" as a descriptor for this participant data theme. The theme of Learner Ownership was developed from four subthemes: Self-Directed Learning, Peer-to-Peer Learning, Facilitating and Mediating, and Personal Learning Systems. Each of the subthemes was supported by two or more constructs to enable a

deeper understanding of the individual, group, and device dynamics of how the participants' experienced learner ownership within various military student BYOD enabled courses.

Self-directed learning. Within the Learner Ownership theme, the subtheme of self-directed learning was common across the participant interview and focus group data. The participants' descriptions of self-directed learning within their BYOD environments were similar. Chris commented,

> We literally put the onus on them. Their career is their career. If you want to progress and you want to succeed, it's on you to do it, because now we're no longer taking you block by block by block [in the course].

In the third focus group, Kevin offered comparable statements:

> But here in this environment, they have to have the teamwork, working together, but they have to reach that goal. So they have the challenge in the mandate to them, "I've got to do this [lesson] 'cause that's part of my job."

Earlier in his individual interview, Kevin also commented on how his experience in the student-directed learning environment aligned with his teaching philosophy: "I really don't teach anybody. People teach themselves. Does that make sense? The way you learn. People learn on their own."

This ideology on self-directed learning also reverberated through participants' respect for their students. Chris noted "how brilliant some of the minds we have." Bryan described "exceptional students" by way of how they "figured out how the course works, how [they] needed to learn, how [they] needed to address the materials and stuff." George restated a similar sentiment in the second focus group:

> These kids don't get enough credit. A lot of them have never seen networks or anything like that, so they're coming in and they want to learn . . . but bringing the technology in really turned around how they interacted with the classroom, with each other.

Ian concluded with his experience of how self-directed learning yielded a student-pull versus instructor-push for learning: "They just wanted all the information. All the time. They wanted as much as they could get." The study participants' transcripts extended self-directed learning by underpinning it with two constructs: (a) control of learning and (b) how student control manifested in classroom inquiries.

Cross referencing replies to the questionnaire prompt, "Computers would motivate my students to study more," with their interview and focus group statements revealed some unexpected results. Participants' responses to the questionnaire were widely distributed across the responses: strongly agree (16%), agree (42%), neutral (33%), and disagree (9%). I was unable to correlate the five neutral/disagree questionnaire replies with the interview and focus group data which indicated student control of learning yielded improved performance. In one example, Chris strongly agreed that computers would motivate his students to study more, and his interview comments signaled the same position: "We were able to leverage [BYOD] for the better because we're able to provide them a more complete understanding of what they're doing and why." In another example, there was a weaker correlation between the questionnaire and interview/focus group responses when Luke was neutral in his questionnaire reply that computers would motivate his students, yet stronger in his focus group comments regarding the connection between computers and students' motivation to learn:

> But it still lets them find a way to express themselves, and sometimes I do feel that they tend to grasp the concepts better if they're control given their own resources to do so,

with those small group collaboration type of concepts and ideas, rather than a student that's put to sleep by an instructor drilling on for hours and hours in front of a classroom. Other than some variation in data correlation between the questionnaire and interview/focus groups, the participants' verbal comments were favorable regarding the relationship between student control and their learning experience. Harold stated, "A lot of their learning and their self-learning and their group learning has been on things they wanted to learn" Chris observed, "No longer are we kicking students out when it's break time. They let students stay in there and study because they actually want to." Edward added, "Yeah, or the weekend. If they want to sit at a picnic table between the two buildings [for connectivity] and work on research or homework assignments or prepare for a project next week." Daniel agreed: "I see it on a regular basis when I drive by the schoolhouse. I see students outside as close to the building as they can get to get their information as quick as they can." George concurred in his interview, "They could connect up, and they would sit there in the hot sun and be working on their homework, because they want[ed] to get done." Ian's experience concluded the impact of student control over their learning: "[Students] gained a better understanding of the whole picture, just because they had the ability to go home and build their own stuff, and bring in articles, and do their own research." In addition to the agreement between participants regarding the positive impact which student control had upon learning, the interview and focus group data also revealed how student control was manifested in classroom behavior.

During their initial instructor training and development, the participants were prepared to instruct in a teacher-centered classroom where student participation was solicited through questioning techniques. When reflecting on their instructional experience, some of the participants were present during their school's transition to a student-centered BYOD design,

while others joined the faculty of courses which had previously integrated BYOD. In both cases, these instructors experienced a shift from teacher- to student-led questioning techniques concurrent with the integration of student control of the learning environment. As an instructor who experienced his school's migration to student BYODs, Chris described the change in student questions:

> Prior to the devices, you would actually have to insert a question to get [the students] to talk. It was very forced and it was not a natural occurrence at all, because, at that point, students were there, they were just . . . it was death by PowerPoint. It was just being shoved down their throats with a fire hose. So having to try and break that up with forced discussion and interaction, it was a very unnatural type of scenario, so you would get poor responses.

George also experienced a transition to BYOD within his course and commented on the impact to student-initiated questions: "To me, bringing that technology in increased that collaboration. Prior to that, when we were standing up doing a lecture, students would [only] discuss or ask questions based on what they learned that day." Daniel added during the first focus group,

> As we're lecturing, they're utilizing their device and they're taking notes, and highlighting. But we also find that some of them would go back to the dorms and look up some of the information, and bring back [questions] that relates to that particular topic.

Jason joined the faculty of a course which had already implemented student BYOD-use, yet his interview comments were similar to the participants who were earlier adopters of BYOD:

> Students were able to formulate their own questions on their own time [using BYOD], and they were able to come in and ask about it. At that point, it becomes a group

> discussion and we all stop for a minute and we talk about it and it really, really garnered that natural collaboration in a classroom.

Frank's commentary echoed the sentiments of the other participants and also served as a summary of how student control has manifested itself in classroom questions in pursuit of self-directed learning:

> So, the quicker we can get that student to know what types of questions and who to ask and where to go . . . [such as] I need to go to the instructor, or I need to go to someone else. The quicker we can get them to understand that, the more successful they're going to be.

Peer-peer learning. While the BYOD environment has enabled student self-directed learning, evidenced by more frequent student questions as compared to instructor-led classrooms, another dynamic experienced by the participants was student peer-to-peer learning. The participants' experiences in BYOD classrooms included a common description of leveraging different student viewpoints, interpretations, and understandings to support peer achievement of learning objectives. Chris generalized the variation in student frames of reference:

> I may see something in a totally different light and understand something totally different than the person next to me, and there's nothing wrong with that. That's part of the human factor, and it may enlighten somebody to open up new avenues and think about things in a way they had never thought of thinking them before.

In his interview, Luke concurred, "You can give a group of students the exact same materials and no two people will read it exactly the same." Other participants also shared sentiments on the diversity of students' contextual understanding of their classroom subjects. Luke's students often shared a "different take" on the material. Edward said that his students' viewpoints were

"not exactly the same," while Daniel added that different understandings inspired "healthy conversations" in his classroom and Bryan mentioned that students "would reach out to their peers to [re]solve understanding." The participants felt that it was not only important to recognize different peer learning perspectives, but to also acknowledge (in their teaching practices) that their students preferred learning from peers over learning from instructors.

During his interview, Frank reflected on his students' inclination to rely on their peers to clarify their understanding:

> I would often find that students, because there's a generational gap between me and the students, almost 40 years, they can explain things to each other using their own language and their own . . . and it could be something very subtle, but the light bulb clicks, and they could say almost exactly the same thing that I just said, that the student asked a question about.

George elaborated on this point during a focus group discussion:

> [When] talking to an instructor as a student, you're not as open. Not everyone isn't that way, but most students, they don't like to approach instructors. They like to approach their peers, because they can, they're on the same level.

Throughout the interviews and focus groups, several other participants offered similar experiences with students' inclination toward peer learning. Bryan "even noticed that during physical training, they were jogging along and discussing [the curriculum]." Kevin noted that some students preferred to work in solitude, yet when inspired or urged to collaborate, they selected their peers over instructors:

> It's a mixed bag. You have the type of student who likes to learn and do it on their own and then you have the kind that the buddy . . . They've been through, I went through the

with this guy or three or four together, and all of a sudden they're all sitting at the same table as much as possible and working together.

Jason's comments were unique when he speculated that students were not necessarily attracted to peer collaboration, but that they sought out their fellow students (in lieu of their teachers) as a more productive pathway to learning. "They're intimidated by the instructors, especially with me and whatever. So that encouraged them to talk amongst themselves, try to figure it out." The remaining participants' experiences were more indicative of students' inclination to defer to their peers for advice. The individual interviews and focus groups contained analogous dialogue on this inclination: Luke emphasized that student like to "talk to their peers," Harold often experienced students "tell[ing] other students [of their discoveries]," and Chris regularly witnessed his students "reach[ing] out to their peers." During his focus group, Frank enumerated his group's experiences: "They are much more likely to ask each other a question than they are to involve the instructor, and I'm not sure why that is."

Facilitating and mediating. While the participants recognized the benefits of peer-peer learning, which their students preferred over instructor-centered learning, they also acknowledged their role in facilitating effective peer-collaboration. During his interview, Daniel explained, "With technology in the classroom, and their ability to do some research, it does bring forth some spontaneous conversations, a lot of active learning, but also some disagreements." George also commented on teacher facilitation in his first focus group: "One of the things that we're trying to do as well is take those students that have that faster knowledge, that faster understanding, that higher level, use them to get that peer-to-peer conversation going." Luke described a similar technique: "Generally I try not to give a student a direct answer . . . I will

have another student who really gets it or thinks that they get it, try to answer that question for them."

Other participants' also mentioned that facilitating peer learning had enriched their classroom environments. Ian and Harold described how they would ask students to investigate freeware programs and share their results with the class. Bryan mentored his students to "get help from their peers that are ahead of them in the course," while Jason "encouraged [students] to talk amongst themselves, try to figure it out" and Edward's technique was, "You can have one guy teach the other guy." Finally, Chris, Frank, and Daniel had facilitation experiences which were unique but worth mentioning. Since they were both assigned to their courses during an initial BYOD adoption period, their students' learning management system also included an instant messenger (IM) functionality. In Chris's experience, the IM application served as an additional mediator to peer-peer learning:

> There's some students that don't want to speak out loud about things. But suddenly they have this capability to send each other a message, and so it's one of those things that promote[d] that ability to solve things at the lowest level. We wanted them to be able to reach out to their peers and learn from each other.

Additionally, Frank and Daniel's interview data also included descriptions of how their students frequently used the IM and e-mail applications within their schools' software to collaborate. All three participants felt that these tools served a productive purpose in mediating peer learning within their courses. At staggered points within the year previous to their interviews, all three participants' education departments elected to disable the student IM and e-mail functionality. Frank recalled,

> It was interesting to see some of the messages being sent from student to student, during class time. Now, they've since . . . I do not know the reason. I was out of the course when the decision was made, but they've since shut that feature off.

The participants' experiences were personalized and also consistent in their recounting the benefits of student peer-peer learning, their students' inclination for learning through their peers, and the teachers' role in facilitating peer-peer learning in a BYOD environment.

Personal learning systems. The learner ownership theme was bordered by the last subtheme to develop from the data: Personal Learning Systems. The subtheme of personal learning systems emanated from participants' descriptions of students' use of their owned devices within the teaching and learning environment. This subtheme described the learners' digital tool which has become a familiar, intimate, and practical pathway to their research or their schools' learning management system. In some participant experiences, the latter also included instant messaging or e-mail applications.

The participants' interview and focus group data were consistent in revealing the students' preferences for developing a personal learning tool, so the responses to two participant questionnaire prompts was also integrated within their collective voice in this subtheme. When assessing their attitudes about computers used as instructional enhancements, 83% of participants disagreed with the statement, "Computers complicate my task in the classroom." The remaining two instructors responded as neutral and agree. In addition, the questionnaire solicited responses to the broader and positively stated prompt, "Computers have proved to be effective learning tools worldwide." All instructors agreed with the second statement, signaling that they also possessed favorable attitudes on the use of computers as instructional enhancements. Furthermore, the participant comments within their focus groups and interviews principally

emphasized device ownership as the conduit to establishing a personal learning system to serve their continuum of learning which extended from their initial training to employment within their new occupation.

Harold's comments during the second focus group connected the constructs of learning, device ownership, and continuation into the students' new occupations:

> They were willing to work on things on their computers because they knew at the end of the term of the school house, they didn't have to turn those back in. Those were their files, their notes to keep and utilize later in their career.

In the first focus group, Chris echoed Harold's statements by spotlighting the importance of leveraging student ownership of their devices as learning systems:

> What is one thing all of these students do every day? They leave here, they go get changed into civilian clothes and what do they do? What's the first thing they're on? Their cellphone. So we were like, "Let's leverage that."

Other participant interview comments also supported student ownership of devices as learning enablers toward occupational development. Instructor descriptions of owned devices included "exclusive tool" (Ian), "personal machine" (Edward), "helps build certainty" (Bryan), and "stores learning which continues with them" (Frank). Harold's individual interview comments provided additional granularity:

> I'm a proponent of ownership in all things, and I really do believe that the ownership of the smallest things in a process really drive what that end product is. And in this case the end product was a student learning and understanding a process, a technology, a concept.

While the participants agreed on the importance of students' ownership of their devices, I continued to drill into the data for their perspectives on how ownership enabled learning in a BYOD environment.

Anthony experienced an early adoption of BYOD within his course, so he was able to contrast borrowed and owned devices in terms of student comfort. Within the first focus group, he shared, "The only benefit that I saw from the switch from government issued PCs to BYOD, is the student's comfort level operating on that device. They didn't have to struggle with a one size fits nobody." Chris shared a similar experience during his interview: "We found that people are most comfortable using the devices that they own because then there is nothing for them that they have to set up, nothing outside of the norm for them." George was also an early adopter and stated in the second focus group,

> When they opened it up to allow them to bring their own devices in, we had a massive change in the way students use that technology, because they were happier bringing their $3,000 computers in to use them, because they were comfortable using those.

When Bryan shared his experiences with student comfort with their personally owned machines, his comments included both hardware and software preferences:

> You have a lot of people that are Apple users, but you gave them machines that were Microsoft, and they struggle. Not that they couldn't do it, but they had to relearn because all they ever grew up was Apple, or all they ever grew up was Microsoft.

Within the third focus group, Luke commented on the "personal freedoms of expression" of student-owned devices and Kevin explained how that personal freedom resonated in his students personal learning styles where some of his students preferred to learn in silence and others while listening to music on their headphones.

As participants' experiences indicated that students' comfort levels with personal devices were higher than with borrowed devices, a gap remained in how device ownership and comfort enabled learning. In his focus group, Harold's comments provided a glimpse into personal devices and a student's immersion into the course curriculum:

> When devices were being provided to you, you get what you get. When you're bringing your own device, if you're a MacBook user and you're very proficient with all of your shortcuts on the Mac and things like that, and you can very quickly do things, it keeps you efficient in your note taking and what you're doing.

Continuing the theme of the functionality of using a personal device to delve into the course curriculum, Anthony described a practical advantage: "It was a lot easier for them to be scrolling through and catch that spot where they highlighted something in red because it's quicker to scroll through than it is to flip pages." George continued in his interview, "The individual knew that using their own personal device, they could find the information faster. They could manipulate something, draft out a diagram, draw up their own network on a device they were comfortable with."

The practical advantages of note taking and diagramming the curriculum on personal devices continued to be mentioned by the instructors. In his interview, Edward explained,

> [The loaned computers] were not very good for anything useful like Microsoft PowerPoint or even just typing, trying to take notes on one of those little keyboards. A lot of people found difficult. So having their own devices gave them the ability to take those tools and run with them and really take good notes and really utilize their devices.

Daniel added,

> Note taking . . . on the document itself . . . is actually very handy. You select an area that you want to talk about, and you put a comment there, and when you go home to study, guess, what, that comment is associated with what you were teaching, or what you were reading. Whereas, many times, when someone takes a note, they don't recall where in the study guide that that was. Now they can connect it the two pieces together. And that's very valuable.

While the majority of comments on how curriculum immersion enabled learning included note-taking, diagramming, and word searches, three participant experiences included students' leveraging their technology as pathways to research (Ian), messaging their peers and teachers (Chris), and completing homework assignments (Luke), all in pursuit of achieving their course objectives.

Based on the literature review, I did expect the dynamic of BYOD-associated student distractions to arise within the interviews and focus groups. Other studies have indicated the strong presence of personal distractions (Ravizza, Hambrick, & Fenn, 2014; Risko, Buchanan, Medimorec, & Kingstone, 2013; Sana, Weston, & Cepeda, 2013), and bystander distractions (Dietz & Henrich, 2014; Sana et al., 2013; Synnott, 2015) associated with the students' use of devices in the classroom. Surprisingly, the issue of student distractions was mentioned only twice across the data collection. In one of those cases, the participant also offered a neutral response to the first questionnaire statement, "Computers complicate my task in the classroom." Jason stated,

> I guess to tell you the truth, it's not made much of a difference. It's maybe at times hindered it a little bit because the students are concentrating on what's on their personal

> computers instead of perhaps listening and researching, with their computers, for my subject material. So it's a little bit of a disconnect sometimes.

The second mention of student BYOD-related distractions related to bystander distractions. Kevin noted,

> Sometimes I walk over and look, what's this? They'll have a split screen and they'll have a video going at the same time. They only thing about that, I'll tell them, "Okay, if you're distracting the other students then I'm gonna have to have you move over to the desk by yourself or you have to shut that off." Now, I ask the other students is that distracting you, you know. "Well, a little bit." But at the same time, I don't want that student that I'm taking away whatever they're using that actually helps them, because then I'm going to be restricting them from learning. So, I gotta find a medium in between the two. So, like I say, I have to be cognizant of each student's capabilities or what is a distractor or a helper as far as studying and learning.

Interestingly, when correlating Kevin's disagreement with the questionnaire statement that computers complicate his tasks in the classroom and his statements on student distractions during his focus group, one conclusion is that while he recognized that bystander distractions are present, he did not feel that they complicated his teaching tasks, since he adapted his response to individual students. By applying the same questionnaire-interview correlation and logic, it could be extrapolated that Jason's experience of BYOD-related individual distractions may or may not complicate his tasks in the classroom. While the mention of student distractions was rare within this study, the participants were more united in describing how the comfort and confidence they associated with the use of devices enabled their students to better immerse themselves in their course curriculum.

The guide post which consistently permeated the participants' experiences was the distinction between borrowed and owned-devices. The instructors felt that ownership of the devices inspired the confidence and curriculum immersion which catalyzed the students into ownership for their learning experience. Harold concluded,

> And by them [students] taking even the smallest amount of ownership in that learning process and these are my notes and this is my device. I'm going to keep these and I'm going to make sure that these are good. And really just owning that, just that small little thought process on the front end really helps drive ownership through the process of learning to the point where the end result is on whole a student is coming out the other end with a better understanding of the material.

In summary, the participants' statements emphasized the student's personal preferences for the device was not as an end state, but rather a pathway through a learning management system, community of practice, or other social learning system.

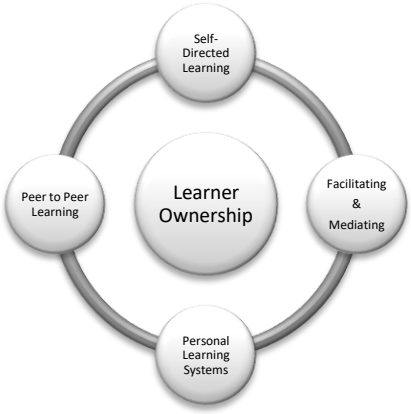

Figure *4.* Data analysis uncovered four subthemes —self-directed learning, peer-to-peer learning, facilitating and mediating, personal learning systems—which joined together to form Theme 4: Learner Ownership.

Summary of themes. Several passes across the data from the three collection instruments, with coding of the interview and focus group transcripts, revealed four themes from this study. The themes were (a) adopting a BYOD culture, (b) student primacy, (c) BYOD instructor attributes, and (d) learner ownership. Each of these themes also generated multiple subthemes supported by participant statements and examples which added detail and texture to the themes. The analysis process included triangulation between the questionnaires, interviews, and focus groups to support the credibility of the themes. A synthesis of the themes indicates that adopting a BYOD culture of learning empowerment within a military training institution was enabled by instructor attributes, such as adaptation and commitment. Student primacy required that these instructors subordinate their previous teaching methods to a student-centered model, which enabled learner ownership through collaboration with students 'peers and with their personal learning systems.

Research Question Responses

The purpose of this study was to understand how military instructors describe their experiences of leveraging student BYODs into their teaching practices; therefore, the transcendental phenomenology method was selected for this study (Moustakas, 1994). The themes and subthemes which emerged from the data analysis were applied to answer the central research question and four guiding questions. The following research questions marshalled this study.

Central research question. The central research question which guided this study asked, "How do military instructors describe their teaching experiences when incorporating student-owned devices into teaching and learning activities?" The participants described their experiences in different ways which were mediated by the period in which they entered the

BYOD migration within their course of instruction. The early adopters of BYOD generally had more positive experiences than instructors who transitioned into courses following a full integration of the devices. Over time, both groups reported that adaptation was the catalyst to a positive experience when incorporating student devices into their classrooms. To provide a detailed description of the phenomenon, the study findings addressed four more precise and guiding questions which sought to address instructor modifications to their teaching practices in pursuit of productive student collaboration and discourse in response to students' use of their personal devices in the classroom.

Guiding Question 1: The first guiding question addressed by this research asked, "How do participants describe their experiences with the quality of student-to-student collaboration in a classroom which incorporates student BYODs into teaching and learning activities?" This question sought to describe the instructors' perspectives regarding how student BYOD-use impacted student interaction and learning. Collaboration as applied to this study was framed by Dewey's (1916) social transmission theory and examined the relationship of interaction and learning. Within this context, collaboration was examined as the interaction between students and their peers, and then between students and instructors. When examining the participants' experiences with the quality of student-to-student collaboration in a BYOD classroom, the first guiding question was answered by Theme 1 (adopting a BYOD culture) and Theme 4 (learner ownership). The data indicated that the students, through the use of their devices, were predisposed to work together toward their learning objectives. Additionally, while student peer collaboration was natural, it also required teacher facilitation and mediation to remain effectively focused on the subject.

All of the participants possessed training and experience in teaching within instructor-led environments. About half of the participants were assigned to BYOD courses during a transition to student-centered instruction, and the remaining were migrants into an established BYOD environment. Instructors reported that student device use enabled their preference to collaborate with peers when completing their lessons. Chris noted, "Students would collaborate on things that we had never seen before"; Ian mentioned, "It [collaboration] really opened up"; George stated that "students shared ideas more easily"; and Frank observed, "I see them picking up and talking amongst themselves, and I relate that to the change in the environment." Jason, a BYOD migrant, noted in his interview, "Students were able to formulate their own questions on their own time . . . it really, really garnered that natural collaboration in a classroom." The themes also revealed that student empowerment was a catalyst to the quality of their collaboration.

Participants reported across the three data instruments that their BYODs enabled a sense of student learning empowerment that they had not previously experienced. The student device "lets the student be a little more freer to express themselves" (Luke), and "it allowed them the freedom to get ahead of their material. . . . They would start talking amongst themselves" (George). Jason witnessed students leveraging their devices "so they can show their peers and collaborate with peers" on new information in the course. Students were also empowered to share their research. According to Harold, they "downloaded it on their own personal device, and then they were able to bring it in and share what they had discovered." While participants agreed that students were inclined to work with their peers in BYOD environments, they also emphasized the teacher's role in mediating collaboration to facilitate student learning.

Instructors who were proactive in facilitating their students' inclination to partner with their peers encouraged productive classroom collaboration. Examples of how teachers

encouraged peer learner collaboration included assigning team research projects and reporting findings to the class (Ian, Harold, Edward, Daniel), engaging peers ahead of them in training (Bryan, George), and encouraging students to work with their classmates to resolving learning gaps (Jason, Frank, Chris). Instructors also sustained collaborative environments by sponsoring daily cross-tell sessions with their class to summarize lessons learned and offer advice for the way forward (Luke).

Themes 1 and 4 answered the first guiding question by illustrating that the quality of student-to-student collaboration was improved in a BYOD environment when compared to the participants' experiences in an instructor-led environment. The themes also expressed that student peer collaboration was naturally inclined because the learners felt empowered by their devices. In order to harness that empowerment, the participants' served as proactive facilitators in establishing and sustaining student to student classroom collaboration.

Guiding Question 2: The second guiding question asked, "How do participants describe their experiences with the quality of instructor to student collaboration in a classroom which incorporates students' BYODs into teaching and learning activities?" All four themes of the data analysis informed the response to this guiding question. While student-to-student collaboration supported a participative learning environment, student-to-teacher collaboration enhanced that setting. Specifically, students' use of BYODs improved the quality of teacher-learner collaboration. Participants discussed how they adjusted their BYOD teaching method to establish and sustain collaboration with their students. Prior to their BYOD teaching experiences, the participants taught using an instructor-centered lesson delivery method where collaboration was inspired by instructor questioning techniques based on information regulated by the institutional lesson plan. When reflecting on their pre-BYOD experiences, several of the

participants characterized this directive approach as “difficult [to] deal with” (Kevin), “forced” (Chris), “unnatural” (Luke), and “shoving information into the students” (Daniel). Once the teachers transitioned to the BYOD classroom, they adapted to receiving student inquiries. Chris explained, “[The students] would open up discussion to the instructor about, ‘I don't understand this.’” Adapting to this new environment required the instructors to narrow the aperture of their collaborative efforts from group oriented to individual student learning dynamics.

Most participants indicated that their experiences with the quality of instructor-student collaboration were initially questionable. Within teacher-centered classrooms, they relied on verbal and non-verbal responses to determine if students were keeping pace with their lesson delivery. After transitioning to self-paced BYOD classrooms, the group-paced collective feedback shifted to individual student-inspired interventions, which was challenging at first. With experience, the participants reflected that individual instructor-student collaboration became more productive. Chris felt that “the interaction with the students was probably the best” while Daniel explained that “bringing that technology into the classroom enabled the instructor to say, let’s read it together and figure it out.” George added, “To me, bringing that technology in increased that collaboration. Prior to that, when we were standing up doing a lecture, students would [only] discuss or ask questions based on what they learned that day.” While the participants concurred that the quality of instructor-student collaboration had improved over their previous non-BYOD experiences, they also emphasized that their engagement enhanced that collaboration.

Similar to the effect on student peer collaboration, instructor mediation also improved student-to-teacher interactions. The data illustrated that student-to-teacher collaboration was improved and sustained through the instructors’ focus on individual student needs. Kevin

explained, “We have to adapt our teaching style almost every day with different students, because each of them is an individual.” Other participants described how they targeted (vs. generalized) their exchanges with students as “symbiotic” (Luke) and “adaptive” (Bryan) in “getting that conversation going with them to make sure they understand” (Edward). Participants collaborated with students by assigning research and briefing projects (Daniel), engaging introverted self-paced learners in spontaneous group discussions (Luke), and instigating instructor-led class discussions during ad hoc classroom disruptions (George, Frank, Jason). In his interview, Chris described the experience as “a no-holds-barred open conversation.”

Student-to-instructor collaboration improved through the teachers’ proactive engagement of their students. The BYOD environment required that instructors evolve their methods to share classroom control by transforming from classroom leader to facilitator and mentor by aligning with individual (vs. group) learner needs. Based on the participants’ experiences, all four themes in the research data answered the second guiding question; student collaboration improved in classrooms which incorporate students’ BYODs into teaching and learning activities.

Guiding Question 3: The first two guiding questions were centered on classroom collaboration, while Guiding Questions 3 and 4 focused on discourse within the classroom. Extending student and instructor collaboration in a BYOD environment, this research also considered how the participants pursued active, reflective, and critical discourse in the classroom. Within this study, student and teacher discourse was informed by Mezirow’s (2006) transformational learning theory, which encourages the creation of opportunities to foster voluntary participation in classroom discourse for the benefit of all learners (Mezirow, 2012). The third guiding question asked, “How do participants describe their experiences with the

quality of student-to-student discourse in a classroom which incorporates students' BYODs into teaching and learning activities?" This question was addressed by Theme 3 (instructor attributes) and Theme 4 (learner ownership).

When applying this theoretical lens to determine whether discourse in the classroom learning environment was occurring within this research, I sought evidence which indicated that students were making a critical examination of their learning objectives (Mezirow, 1994). Evidence of student discourse, while not as frequent as collaboration, emerged within the subtheme of self-directed learning. This type of learning consists of exercising individual initiative, with or without assistance, to formulate learning goals, and to identify resources and methods for learning (Avani, 2017). The participants commented on the diversity of their students' contextual understanding of their subjects and how they often challenged their peers within the student-centered BYOD classroom. Those peer examinations presented as questioning, debates, presenting different perspectives, and conversations to resolve divisions in understanding (Luke, Edward, Daniel, Bryan). While the instructors acknowledged that students preferred to learn from their peers, evidenced by the frequency of collaboration in BYOD classrooms, they also discovered that student-to-student discourse benefited from instructor mediation.

To encourage student-to-student discourse, the teachers purposefully incorporated student investigation into their teaching methods. Instructors noted that students who embraced, presented, discussed, and defended their research with their peers were more apt to develop self-reliance, confidence, and success within their course (Jason, Ian, Frank). Students' critical thinking also benefitted from peer debates of discoveries made on their devices (George, Harold, Daniel, Luke, Kevin). Although the teachers' methods of encouraging peer discourse varied,

their common goal remained to extend student collaboration toward critical and active classroom discourse.

The themes of instructor characteristics and learner ownership described the experiences of deep student interactions in the form of classroom discourse. Since the BYOD environment is student-centered, learners' critical review of course objectives was more frequent than participants' previous experiences in teacher-centered classrooms. Teachers believed that student peer discourse was the catalyst to productive learning activities, since BYOD inspired a pathway to democratic classroom practices which included student inputs and debate. The increase in the quality of student-to-student discourse signaled that current military students leverage a greater sense of control and critical interaction than their non-BYOD predecessors.

Guiding Question 4: The last guiding question also targeted the students' critical review of subject matter within a classroom but narrowed the focus of that exchange to the student and the instructor. The fourth guiding question asked, "How do participants describe their experiences with the quality of instructor-to-student discourse in a classroom which incorporates students' BYODs into teaching and learning activities?" Of the four guiding questions, this question was less vigorously answered by the research than the previous guiding questions. The premise of this question aligns with the previous question where I was seeking evidence indicating that students, though their peers, were making a critical examination of their learning objectives. The divergence of this question is that I sought evidence of students making an active and critical review of subject matter, through their instructor. Most examples of student peer discourse included questions and debates of other students' ideas, yet these types of student-instructor exchanges often made learners uncomfortable.

Most students within these BYOD blocks of technical training began the program following their completion of basic military training. In contrast to the military technical training BYOD environment within this study, the learning conditions within the services' basic enlisted training is instructor-centered, directive, and seldom invites trainee collaboration or discourse. Additionally, while all of the instructors within this study were trained to solicit active student participation (Suit et al., 2015; U.S. Air Force, 2003; U.S. Army, 2018; U.S. Navy, 2010), they were also formed to teach in an instructor-centered environment. In sum, the military student BYOD environment that employs a student-centered learning approach which invites and encourages active and critical discourse was anomalous to both the students and the instructors. The data analysis revealed that the fourth question was principally informed by Theme 1, adopting a BYOD culture.

Considering the classroom range of interaction from collaboration to discourse, it was the discourse between students and instructors which was the least often experienced. The participants were uncertain if the contributing factor was a "generational thing" (Frank) or a "change in the BYOD environment" (George) or the instructors' refusal to adapt to the BYOD culture (Bryan, Edward, Anthony, Daniel). Regardless of the cause of infrequent student-teacher discourse, the participants continued their endeavor to invite critical classroom discussions. Participants reported that BYOD connectivity was, barring a few brief exceptions, constrained to an LMS intranet within the classrooms, limiting access to the student break areas and dormitories. The instructors mentioned that when students briefly obtained classroom connectivity, they leveraged on-line resources as opportunities for critical discourse with their teachers. For example, George described the following student interaction after their classroom instruction:

> The students [would] say, “Well,” and they would start Googling. Then they would pull up information that would lead them to, “But, what about this?” Or, “Why is that not the same as this?” Or, “Why is that different than what they’re telling me here?” It didn't happen that much in the classroom as much as it did when they got out of school.

Ian shared similar experiences with limited student connectivity and student initiated discourse:

> I think that’s the most discourse I ever saw was, why don’t you teach us this technology versus this technology [referring to a web resource]? Why do you teach us this routing protocol versus this routing protocol? Or, I looked up this keyword, and it brought up these five different topics, but you only teach us two. Why don’t you teach us the other three?

Daniel also summarized his experiences with limited classroom connectivity and its impact on classroom discourse:

> It might have led us to a debate that was off topic, but very valuable to the overall course. So there’s a lot of value added there. It brought some positivity into the classroom, in that they’re able to look things up, present it to myself, and then I was able to elaborate on that.

The remaining participants who did not experience classroom internet connectivity shared their experiences of encouraging, through questioning techniques, their students’ critical review of objectives. The instructors inspired debates by first questioning students’ understanding and then contrasting it with conflicting peer perspectives through overhead questions (Kevin, Daniel), which “generated a lot of debate between them” (George). The participants concurred that whenever possible, they leveraged classroom internet connectivity,

ad-hoc debates, or provocative questioning to inspire their students to critically examine their lesson topics (Frank, Anthony, Edward).

The participants believed that both instructors and students were natives to the military BYOD learning environment, and that the student-centered approach was a dramatic contrast to their trainees' recent experiences in basic enlisted training. This shift in the military learning environment tempered the students' inspiration to engage in critical discussion with their instructors, which handicapped classroom discourse. The participants acknowledged these limitations by encouraging a permissive atmosphere of student feedback to encourage productive classroom exchanges. The data supported that while student-to-instructor critical discussions occurred less frequently than that of collaborative exchanges, the quality of the BYOD classroom discourse remained an improvement over the participants' pre-BYOD teaching experiences.

Summary

This transcendental phenomenological study investigated military instructors' experiences with classroom use of student BYOD. The participants were all male, Caucasian, and ranged in age from their 20s up to 70. Several of the participants were former instructors with recent teaching experience of at least six months within the military student BYOD environment. Many of the participants reluctantly entered the teaching profession as information technology or electronics specialists, and following a period of transition, reported high satisfaction with their careers as trainers.

The study relied on triangulation across the three data collection devices: the instructor questionnaire, the interview, and the focus group. The interviews and focus groups were all recorded and transcribed. After completing the epoché process (Moustakas, 1994), I made several passes across the data and added codes with each subsequent review. The codes were

reviewed and assessed for duplication and overlap and then clustered into themes. The themes which emerged were (a) adopting a BYOD culture, (b) student primacy, (c) BYOD instructor attributes, and (d) learner ownership. These themes answered the central and guiding research questions.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this transcendental phenomenological study was to describe the experiences of military instructors who use student BYODs in their classrooms in a DoD technical training institution in the southeastern United States. This chapter summarizes the findings of the research and provides a discussion of how this study relates to prior research and the theoretical framework. Also included is a description of the theoretical, empirical, and practical implications of this research. This chapter concludes with an outline of the study delimitations, limitations, and suggestions for future research.

Summary of Findings

Moustakas' (1994) transcendental phenomenological research method was used to achieve the study results presented in Chapter Four. The results were organized into themes, phenomenological descriptions, and answers to the research questions. The four themes which emerged from the data analysis were as follows: adopting a BYOD culture, student primacy, BYOD instructor attributes, and learner ownership. These themes were formed by the phenomenological descriptions and answered the research questions.

The first theme to develop within the data analysis was adopting a BYOD culture. This theme was bounded by three subthemes: faculty reflex, student reactions, and empowerment. The subtheme of faculty reflex described participant experiences during their transition from a traditional instructor-centered practice to a student-centered BYOD environment. While initial experiences with BYOD were mixed, over time the participants evolved to view the transition as positive on the teaching and learning environment. Participants' perspectives on student reactions to BYOD also varied, yet the majority felt that students reacted positively to their

ability to use personal devices in the classrooms. Instructors felt that the devices enabled students to bridge communication barriers by collaborating more frequently and effectively with their peers and teachers. A few of the participants were more reticent in endorsing the devices in support of classroom collaboration yet acknowledged the students' preferences for using personal devices. Empowerment was the third subtheme within the theme of adopting a BYOD culture. From the participants' perspectives, employing personal devices increased students' control over learning through sharing their discoveries with their peers and instructors. These discoveries were often revealed through students' research into topics introduced in their program. Facilitated by their devices, students were positioned to collaborate by critically examining lesson topics, peer comments, and instructor guidance.

The second theme was student primacy, which described the BYOD teaching focus on individual student learning preferences. Student primacy was also supported by three subthemes: engagement, subordination, and rapport. The participant experiences during the transition to BYOD left some instructors feeling less useful in their professions. The implementation of BYODs and the institution's learning management system left some participants feeling that they were no longer required to interact with students, which surfaced as the subtheme of engagement. As they emerged from their transitions into the BYOD classroom, the participants realized that their interaction with students had become more important, requiring a focus on individual student needs in lieu of collective classroom feedback. Concurrent with the subtheme of engagement was the development of the subordination subtheme, which described participants' experiences with modifying their preferred role of teacher-led activities to one of supporting students who controlled their learning environment. The participants felt that instructors who deliberately subordinated themselves to student-

centeredness were also more accepting of student-owned technologies in the classroom. The final subtheme of rapport described the participants' experiences with instructor and student relationships in the BYOD classroom. This subtheme presented as more diversified than the previous subthemes. Some of the participants felt that they were required to make profound changes to their interactions with students, while others believed only minor adjustments were necessary. The participants believed that rapport, while a challenge to establish, remained the catalyst to a productive BYOD learning environment.

The next theme to develop from the data analysis was BYOD instructor attributes. The change from instructor-led to student-led environments required military teachers to defocus on collective class dynamics and converge on individual student needs and abilities, since learners were now progressing at varying speeds. The ability to shift emphasis from self to student drove the emergence of the instructor attributes subthemes of passion and commitment, adaptability, and critical thinking. The participants characterized passion and commitment as the enjoyment, appreciation, and inspiration which sustained them through either their institution's transition or their placement within an existing BYOD program. They illustrated these attributes as dedication, demonstrating pride in what they do, making an impact, and going the extra mile for their students. The participants felt that peer instructors who did not possess a high degree of these characteristics were the ones who elected to resign or retire when faced with the challenge of adapting to teaching with student BYODs. Adaptation was the second subtheme which emerged to support the participants in aligning with student's device use. This attribute was manifested through the participants' deliberate decisions to cognitively and affectively align with students within the BYOD classroom. In most participants' experiences, their efforts to adapt to student-device use and individual student learning differences were reinforced by increased

student classroom performance following BYOD implementation. While adaptation permitted instructors to align with their present state of student-centeredness, it was the third subtheme of critical thinking which empowered the participants to continue leveraging the BYOD domain toward improved learning. The participants continuously sought opportunities to experiment with and manipulate the technology to enhance classroom collaboration and discourse.

The final theme which materialized from the data analysis was learner ownership. While analyzing and coding the research data, learner ownership presented as the conduit to democratic classroom practices which included student inputs and decisions on the sequence of learning objectives and the self-pacing of instruction. From the participants' perspective, the greater sense of control over the learning process appeared across four subthemes: self-directed learning, peer-to-peer learning, facilitating and mediating, and personal learning systems. Self-directed learning was described as a student pull for learning as compared to the traditional instructor push of knowledge to a classroom. Within this context, the participants felt that the devices enabled a better grasp of concepts and ideas when students were placed in control of learning. In lieu of soliciting student lesson involvement, the participants reported that students now assumed a proactive role in classroom activities, research, and productive discourse. The peer-to-peer learning subtheme was a description of students' leveraging different viewpoints, interpretations, and understandings to support peer achievement of learning objectives. Instructors witnessed an increase in students' sharing their contextual understanding of subjects with their peers. Participants reported that students often referred to their devices as they shared their different understandings of topics through healthy classroom exchanges in an effort to clarify concepts. The codes of instructor facilitation and mediation also surfaced as a complement to peer-to-peer learning. From participants' perspectives, facilitation and mediation shaped student investigation

and discourse into alignment with learning objectives. Instructor mediation and facilitation was focused on individual learning needs and harnessed student inspired collaboration to make progress toward instructional goals by using the student device as a catalyst. Students use of their owned devices galvanized the last subtheme, personal learning systems. In contrast to references for continuing professional development of staff (Chesney & Benson, 2012) or social learning systems such as Communities of Practice (Blackmore, 2010), this subtheme was used to capture the participants' description of a learner's digital tool which is a familiar, intimate, and practical pathway to research and learning. Participants reported that students possessed a strong preference in developing a learning tool which would remain relevant, scalable, and under their control and possession across a continuum of initial training through increased levels of professional practice and responsibilities. The participants believed that device ownership was the pathway to establishing and sustaining a personal learning system. Finally, these four themes were triangulated between the questionnaires, interviews, and focus groups to support their credibility. In addition to the four themes, the study results provided answers to the research questions which focused and shaped the study.

The central research question asked, "How do military instructors describe their teaching experiences when incorporating student-owned devices into teaching/learning activities?" To answer this question, the research was shaped by four guiding questions. The first guiding question asked, "How do participants describe their experiences with the quality of student-to-student collaboration in a classroom which incorporates student BYODs into teaching/learning activities?" This question was answered by Theme 1: Adopting a BYOD Culture, and Theme 4: Learner Ownership. Overall, the participants reported that student device use enabled their preference to collaborate with peers when completing their lessons. They noted the increase in

students' sharing ideas and formulating questions with peer students, and attributed that effect to a level of student empowerment which previous students had not experienced. The student-to-peer collaboration was not, however, automatic. The participants' experiences indicated that instructors who were proactive in facilitating their students' inclination to interact with their peers encouraged classroom collaboration. In sum, the quality of student-to-student collaboration was improved in a BYOD environment as compared to the participants' experiences in an instructor-led environment.

Guiding question two inquired, "How do participants describe their experiences with the quality of instructor-to-student collaboration in a classroom which incorporates students' BYODs into teaching/learning activities?" All four themes of the data analysis informed the response of the second guiding question. The participants believed that while student-to-student collaboration supported learning, it was student-to-teacher collaboration which amplified that learning, and that student device use improved the quality of that collaboration. In their experience, they found that students were more apt to initiate discussion and request clarification than in their previous instructor-led classrooms. Similar to the effect on student-peer collaboration, instructor mediation also improved student-to-teacher interactions. The participant data revealed that student-to-teacher collaboration was improved and sustained through the instructors' focus on individual student needs in the BYOD classroom.

The third guiding question asked, "How do participants describe their experiences with the quality of student-to-student discourse in a classroom which incorporates students' BYODs into teaching/learning activities?" Extending student and instructor collaboration in a BYOD environment, this research also considered how the participants pursued active, reflective, and critical discourse in the classroom. This question was addressed by Theme 3: BYOD Instructor

Attributes and Theme 4: Learner Ownership. The participants reported that student-peer discourse was not as frequent as collaboration yet emerged within the learner ownership subtheme of self-directed learning. Student-peer examinations presented as questioning, debates, and presenting different perspectives toward resolving understanding of classroom concepts. The learner ownership codes of facilitating and mediating addressed the instructors' proactive role in encouraging student peer discourse. To encourage this discourse, participants reported that teachers who purposefully incorporated student investigation into their teaching methods included classroom activities such as peer debates of discoveries obtained through their devices. Since the BYOD environment is student-centered, the study findings indicated that student-to-student discourse was more frequent than participants' previous experiences in teacher-centered classrooms.

Guiding question four inquired, "How do participants describe their experiences with the quality of instructor-to-student discourse in a classroom which incorporates students' BYODs into teaching/learning activities?" Through this question, the research sought evidence of students making an active and critical review of subject matter, through their instructor, within the BYOD classroom. This guiding question was answered by Theme 1: Adopting a BYOD Culture. Participant experiences signaled that while examples of student-peer discourse included questions and debates of other students' ideas, student focus of discourse toward their instructors often made learners uncomfortable. Most students attending a BYOD-enabled program began their training following completion of basic military enlisted training. In contrast to the BYOD environment within this study, the services' basic enlisted training is instructor-centered, directive, and does not invite trainee collaboration or discourse. The participants felt that their students recent transition from basic training contributed to their reluctance to critically engage

their technical training instructors, which handicapped instructor-student discourse. The study results found that the BYOD instructors continued to encourage discourse with their students, which generally manifested in a student's evaluation of the relevancy of subjects selected for training rather than a critical examination of the subject content. The participants acknowledged and mitigated these cultural limitations by encouraging a permissive atmosphere of student feedback and encouraging productive classroom debate with their instructors. The research results indicated that instructor-to-student discourse occurred less frequently than collaborative exchanges, yet the quality of the BYOD classroom discourse remained an improvement over the participants' pre-BYOD teaching experiences.

The four guiding questions yielded findings which were synthesized to answer the central research question which asked how military instructors describe their teaching experiences when incorporating student-owned devices into their teaching and learning activities. Their shared experiences were described through the themes of adopting a BYOD culture, student primacy, BYOD instructor attributes, and learner ownership. The participants' experiences with student BYODs were positive following an initial transition period from instructor-led to student-centered training. Their successful transition relied heavily on their commitment to their profession and their adaptability to a new teaching method. Their adaptation required that they overcome the emotion and cognitive challenges of subordinating their preferred group-paced teaching methods to exercising individual student learning interventions. While students' self-directed and peer-to-peer learning enabled the success of the BYOD environment, participants believed the catalyst was the personal learning device created by the students which motivated students to assume ownership of their learning experiences within this environment.

Discussion

The purpose of this transcendental phenomenological study was to describe the experiences of military instructors who use student BYODs in their classrooms in a DoD technical training institution in the southeastern United States. The social transmission theory and transformational learning theory provided the framework upon which this study was grounded. By focusing on the experiences of military instructors who leveraged student BYODs within their teaching practices, this study filled a distinct gap in the current literature. The study findings corroborated and extended previous research concerning student BYOD-use, social transmission theory, and transformational learning theory.

Theoretical

The theories which framed this research were Dewey's (1916) social transmission theory and Mezirow's (1991) transformational learning theory. While social transmission theory emphasized the value of collaboration in the learning process, the transformational learning theory extended this work by leveraging interactions into critical discourse. Mezirow suggested that students who engage their peers and their teacher in active and critical discourse enhance their learning efficacy. This study incorporated both theories toward gaining an understanding of how military instructors adapted to student device use to establish collaboration and discourse within their classrooms.

Dewey (1980) believed that the experience of the environment affects the learner, and the interaction which takes place between the learner and environment should be based upon an active, dynamic, and developing experience. The social transmission theory encourages educators, thorough collaboration, to transfer their authority over the learning group to the group itself to enable students' developmental experiences. These experiences arise from the

interaction of two principles: continuity and interaction. Continuity is that each student experience will influence their future, while interaction refers to the situational influence on that student's experience. Once that experience (continuity and interaction) occurs, teachers have an opportunity to employ collaboration to meet learning objectives. Throughout the course of this study, the participants shared many of their experiences on how student-to-student or student-to-instructor collaboration enabled an effective learning environment.

The results of this study corroborated and extended the literature on student collaboration, which suggests that millennials favor the use of their technology to socialize (Clegg, Hudson & Steel, 2003; Ryan, 2011) and to collaborate with others (Gikas & Grant, 2013; Kanuka et al., 2007; Mossman, 2012; Otero et al., 2005; Rourke & Kanuka, 2007). Within this study, the participants witnessed that students were predisposed to working together toward their learning objectives, while the three data instruments confirmed that BYODs enabled a sense of students' empowerment to collaborate with their peers and instructors. The study results also signaled that students' collaboration benefitted from teacher mediation as well.

Student collaboration improved when teachers purposely engaged their students. To enable that collaboration, instructors modified their teaching methods to share classroom control with students and by aligning with individual (vs. group) learner needs. The study participants used various BYOD methods to encourage collaboration including assigning team research projects and reporting findings to the class (Ian, Harold, Edward, Daniel), engaging peers head of them in training (Bryan, George), and encouraging students to work with their classmates to resolving learning gaps (Jason, Frank, Caleb). These collaborative experiences within the study correlated directly with the literature, which articulated that when teachers deliberately integrate student devices into their curriculum, students report that their learning is enhanced through

collaboration (Gikas & Grant, 2013; Mifsud, 2014). The study concluded that collaboration was improved in military classrooms which incorporated student BYODs, confirming previous research in civilian institutions (Bell & Federman, 2013; Gikas & Grant, 2013; Mifsud, 2014).

One novel addition to the social transmission literature, which emerged from this study, was military instructors' experiences in adapting their teaching methods to establish and sustain collaboration within the student BYOD environment. All of the participants possessed prior training and experience in teaching within instructor-led group-paced environments. Within this grouping, about half of the participants were assigned to a BYOD course during its transition to student-centered instruction, while the remaining participants were migrants into an established BYOD environment. One unique characteristic of this study was that it captured the adaptive experiences of military instructors in contrast to other studies which focused on examining collaboration as a component of institutional adaptation in support of student BYOD-use (Angeli et al., 2003; Breen, 2015; Crossouard & Pryor, 2009; McNeill, 2012; Yang et al., 2016). Prior to their BYOD teaching experiences, the participants taught using an instructor-centered lesson delivery method where collaboration was inspired by instructor questioning techniques which were based on lesson plan regulated information. Within these teacher-centered classrooms, they relied on verbal and non-verbal responses to determine if students were keeping pace with their lesson delivery. Following their transition to self-paced BYOD classrooms, they mediated classroom collaboration by shifting from group-paced collective feedback to individual student-inspired interventions. The participants reported that by leveraging BYOD-use, students' collaboration with their instructors and their peers became more productive in the self-paced learning environment.

This study illustrated how military students' device use enabled student collaboration and therefore extended the social transmission theory within this environment. The findings of this study contribute to social transmission theory by adding the new dynamic of a specific group (military instructors) who have leveraged student BYODs in their classroom, that had not been previously included in this type of research. This study was also conducted through a secondary theoretical lens of transformational learning theory (Mezirow, 1978).

Transformational learning theory is grounded in the active process of communicating meaning by considering values, emotions, and context through a critical reflection of assumptions (Mezirow, 1998). Mezirow (1991) promoted active student discourse as a pathway to better understand learning experiences. When applying Mezirow's theory to this research, discourse was defined as students' seeking to discern learning content through examples, authenticity, arguments, and alternative meanings (Mezirow, 1978). This study revealed that military instructor participants experienced discourse, yet only after establishing classroom collaboration, which also confirmed previous study results (Barber, 2011; Geelan & Taylor, 2004; Lee et al., 2006; Liang et al., 2010; Vaughan, 2004). Additionally, the participants leveraged student BYODs to establish a collaborative environment, which subsequently enabled classroom discourse. Therefore, this research also confirmed investigations where student devices were used as a catalyst to improve discourse in a learning community (Barber, 2011; Raikou, 2016; Rogers et al., 2016; Stansberry & Kymes, 2007).

Student collaboration and discourse serve as learning enablers (Howlett et al., 2016), which may be leveraged through student device use to support teaching strategies (Mezirow, 1998). This study was designed to examine the experiences of military instructors who routinely leverage the devices to impact their educational outcomes. The findings of this study contribute

to social transmission and transformational learning theories by adding a new and previously unrepresented demographic—military instructors who have taught students employing their BYODs.

Empirical

Most of the previous studies on adult student BYOD-use in classrooms have focused on civilian institutions (Castillo-Manzano et al., 2017; Cheng et al., 2016; Cochrane et al., 2014; Kong & Song, 2015; McClean & Crowe, 2017; Newhouse et al., 2015; Yang & Che, 2015). Little research has been completed that specifically addresses student devices use in a military classroom (Carter et al., 2017a, 2017b; Crane, 2017; Hebert, 2017; McElroy, 2017), and no previous studies were completed on the perspectives of military instructors who teach within classrooms that employ student BYOD-use. This study allowed me to examine a set of teachers that was not represented in the available literature. While findings of this study corroborated the topics in previous research (e.g., device portability and connectivity, student preferences for BYODs, teacher interventions, classroom collaboration, and student discourse), the participants offered little discussion on classroom distractions, and none of the results contradicted previous research.

Many of the studies which examine student BYOD use in adult education emphasize the devices' potentially positive educational impact, encouraging institutional leaders to integrate the devices into their curriculum (Parker et al., 2011). Military education and training schools are cautiously following suit, albeit at a slower migration rate (Edwards-Stewart et al., 2016; Foster, 2016; Lendon, 2016; Roy et al., 2015). At this point, the services have delegated the decision to implement student devices to individual institutional commanders (Suit et al., 2015; U.S. Air Force, 2003; U.S. Army, 2018; U.S. Navy, 2010), which includes the military training programs

embodied within the present study. One correlation between research in adult student BYODs and the present study is the focus on institutional efficacy.

Previous studies and this research agreed on the advantages of student device portability and connectivity (Figueras-Maz et al., 2017; Rosen, 2010; Thompson, 2013). Within the present study, the devices enabled students to schedule their courses, take comprehensive notes, complete research more efficiently, and complete assignments in a fraction of the time as compared to pre-BYOD training. The current study's participants also consistently reported on their students' preferences for personal device use which concurred with studies on millennial and iGeneration student preferences for integrating devices into their lifestyles and learning (Foley, 2014; Mifsud, 2014). While preferences for personal device use were common across the literature, researchers also suggested that instructors who deliberately planned learning interventions for student technology encouraged a positive correlation between device use and students' academic performance.

Deliberate planning includes establishing clear instructional goals for use of the technology prior to delivering the lesson. When deliberately planned and implemented into teaching and learning activities, studies indicate that student devices have a positive impact upon academic performance (Bell & Federman, 2013; Gikas & Grant, 2013; Tamim et al., 2011). While this study did not quantitatively articulate a change in student performance, participants offered anecdotal evidence of students' higher information retention rates, faster progress though their course, and lower elimination rates. These improvements in student performance were attributable to instructors' deliberate engagement with their students by remaining focused on individual interactions. These findings were consistent with previous studies where educators seek to incorporate the devices into their classroom teaching practices with the goal of enhancing

collaborative teaching activities toward improved student performance (Anderson et al., 2003; Caron & Gely, 2004; Foley, 2014; Foster, 2016; Mathews, 2013; Roy et al., 2015; Samson, 2010). While the current study highlighted the value of planning to use student technology effectively, only a few of the participants experienced a wide spectrum of student connectivity.

Student connectivity within the present study was, barring a few exceptions, constrained to an institutional intranet with no outside connectivity. About half of the participants experienced their students' use of Internet-connectivity and an enabled LMS instant messaging application for short periods. In these cases, the teachers uniformly believed this connectivity, before it was disabled, enhanced their students' collaboration and performance. This is consistent with the few previous studies which indicated that enabling military students' BYOD access to the Internet from classrooms improved student learning outcomes (Crane, 2017; Foster, 2016; McElroy, 2017; Roy et al., 2015). In contrast to these study participants, civilian teachers have a wider band of collaborative social networking applications available such as institutional blogs, Twitter, and Facebook to encourage student interaction on topics of study (Arteaga Sánchez, Cortijo, & Javed, 2014; Gao, Luo, & Zhang, 2012; Grosseck & Holotesch, 2008; Hamid et al., 2015). Despite the absence of full connectivity or classroom access to social networks, participants strongly favored student-owned device use in their courses.

Military student BYODs remain anomalous due to DoD network security standards; therefore, most technology is institutionally maintained and loaned to students while in training. This study found that through BYODs, students experienced more control over their learning since the devices were personal and customized, with files retained for use in their post-graduation career, correlating with the DoD's pursuit of re-framing development from episodic experiences to learning continuums (Raybourn et al., 2017). Another anomaly within the present

study is that students did not have Internet connectivity within the classrooms. Previous studies concluded that digital natives prefer multi-tasking such as texting, e-mailing, or updating social media during classroom lectures (Akçayır et al., 2016; Calderwood et al., 2016; Dietz & Henrich, 2014; Figueras-Maz et al., 2017; Rainie, 2006). Researchers suggest that when unrestricted student BYOD-use is permitted, the cumulative impact of the volume and types of information for students to process generates considerable risk of distraction (Gaudreau et al., 2014; Junco & Cotten, 2012; Ravizza et al., 2014; Risko et al., 2013; Sana et al., 2013; Wood et al., 2012). In contrast to previous research, this study's participants did not experience online off-task behaviors; therefore, it is reasonable to assume that constraining BYOD connectivity to institutional LMSs will mitigate some learning distractions.

Much of the literature on student BYOD-use focused on the risk and cost of student distractions in the classroom. Student devices may support learning yet can also distract students and handicap academic performance (Bowman et al., 2010; Carter et al., 2017b; Fox et al., 2009; Hew & Cheung, 2013; Lee et al., 2012; Risko et al., 2013; Sana et al., 2013; Srivastava, 2013; Sweller et al., 2011; Wood et al., 2012; Zhang & Zhang, 2012). Student distractions, like multi-tasking, were a topic which contrasted between previous research and the present study. The participants indicated that student BYOD distractions were not significant and offered anecdotal examples including students listening to downloaded music or watching a video on their split screens while working on their lessons. On a few occasions, these multi-tasking behaviors required instructor interventions to mitigate individual or peer distractions. These experiences within the present study did not correlate nor conflict with the previous studies, but were additive to the research on BYOD-related distractions. Similar to multi-tasking, it is reasonable to

assume that the absence of student internet connectivity contributed to mitigating student BYOD distractions in military classrooms.

This study was empirically consistent with much of the previous research on students' use of BYODs in adult learning. There are few studies which addressed the use of military student-owned device use in classrooms (Carter et al., 2017a, 2017b; Mathews, 2013), yet none which focused on the perspectives of military instructors within BYOD environments. This study contributed to that gap in the literature by adding the experiences of military instructors who leveraged student BYODs within their teaching practices.

Implications

This study examined the perceptions of military instructors who teach in student-centered classrooms which integrate student-owned devices into their training programs. Twelve participants shared their experiences through questionnaires, interviews, and focus groups. The information was analyzed to unveil themes, which provided textural descriptions of these experiences. The findings of this study are consistent with previous research and extend the literature by adding a demographic group of participants not previously examined. This phenomenological study produced findings which have theoretical, empirical, and practical implications and recommendations for military instructors, institutional leaders, and policy developers.

Theoretical Implications

The social transmission theory focuses on how the experience of the environment affects the learner through active and dynamic interaction with others in that environment (Dewey, 1916). That interaction is characterized as the situational influence on the students' experience which will also impact their future. This theory as applied to the present study advocates for

instructors, thorough collaboration, to transfer their authority over the class to the students to support learning. The transformational learning theory concentrates on the significance of reflective, active, and critical discourse of subject matter toward developing understanding (Mezirow, 1991). Within this study, discourse presented as an extension of collaboration when students viewed and discussed topics through a critical examination of doubt, debate, or inquiry. Both the social transmission and the transformational learning theories shaped this study through the lenses of applied collaboration and discourse within the BYOD-enabled military classroom.

The previous research on the roles of collaboration (Breen, 2015; Crossouard & Pryor, 2009) and discourse (Raikou, 2016; Rogers et al., 2016; Stansberry & Kymes, 2007) in the BYOD-enabled classroom focused on institutional implementation of the devices (Angeli et al., 2003; McNeill, 2012; Yang et al., 2016). While this research on student device implementation in schools provided a framework, the present study provided an understanding of how military instructors experienced their transition into a BYOD learning environment. This study facilitated an understanding of teachers' perspectives on shifting from instructor-led training to student-centric, self-paced learning. This shift added to the study's theoretical framework by describing how military instructors adapted their practices to establish and sustain classroom collaboration and discourse as they transitioned from grouped-paced lesson delivery to student-centered interventional teaching.

Student collaboration and discourse serve as learning enablers which can be leveraged through student technology (Howlett et al., 2016; Mezirow, 1998). Training programs which prepare subject matter experts to become military instructors encourage the use of collaboration and discourse to establish permissive classroom environments (U.S. Air Force, 2003; U.S. Army, 2018; U.S. Navy, 2010). This study found that military teachers felt unprepared for the

responsibility of training students through the use of student BYODs. Many participants felt that their lack of preparation triggered initial uncertainty and negative feelings following their schools' implementation of BYODs or their reassignment to a course which adopted student devices. The conversion to student device use required instructors to adapt their established group-paced teaching methods to accommodate individual student pacing, abilities, and needs. As the participants gained experience and assessed students' improved performance and feedback, their attitudes improved along with their motivation to leverage the devices toward encouraging student collaboration and discourse within their classrooms.

This study added to the understanding of the roles of collaboration and discourse in support of social transmission and transformational learning theories within a military student BYOD environment. The findings revealed that the participants felt unprepared for the shift to a BYOD-enabled classroom and described how they adapted to integrate the devices toward establishing and sustaining students' interaction and critical thinking. The research on student device use within the topic of military training is limited, with none of the studies incorporating this theoretical framework. Additionally, this study added a new dimension by including the perspectives of military instructors who share the experience of teaching in a BYOD-enabled technical training school. Recommended future research on student collaboration and discourse within military BYOD classrooms includes an emphasis on instructor preparation and transition programs.

Institutional implementation of student devices would benefit from a narrowed examination of the student-centered (versus group-paced) instructional methods deemed most effective in establishing and sustaining student to peer to instructor collaboration and discourse within a military BYOD classroom. Stakeholders in instructor development programs could

leverage new research by narrowing current group-paced training techniques, which encourage permissive classroom environments, to individual student-focused interventions which empower classroom collaboration and discourse. Also extending these insights to instructor continuation training would provide a widening portfolio of collaboration and discourse techniques for in-service teachers transitioning to BYOD classrooms.

Empirical Implications

Previous investigations into the teaching experiences of military instructors who integrate student BYOD use into their classrooms have not been conducted. While the use of student BYODs in classrooms is empirically supported (Castillo-Manzano et al., 2017; Cheng et al., 2016; Cochrane et al., 2014; Kong & Song, 2015; McClean & Crowe, 2017; Newhouse et al., 2015; Yang & Che, 2015), the military training domain has not reached the student device proliferation experienced by civilian institutions and is considered more emergent in BYOD use (Dede, 2013; Hill & Babbitt, 2013; Scoppio & Covell, 2016; Wyche, 2014), focused on military medicine skills training (Friedl & O'Neil, 2013; Ka-Chun et al., 2016) and cadet education (Carter et al., 2017a). In sum, the literature on the use of student devices within military institutions has been rare, focused on student outcomes, and not inclusive of military instructor experiences.

While the perspectives of civilian teachers are included in research on student BYODs in the classroom (Gillies, 2016; Song & Kong, 2017; Thomas & O'Bannon, 2013; Weber & Barth, 2016; Yanjie & Siu Cheung, 2017), I could locate no studies which specifically address the perspectives of military instructors within BYOD environments. The absence of this group in previous studies may be the result of military training's cautious integration of student-owned

devices at a rate slower than their civilian peer institutions (Edwards-Stewart et al., 2016; Foster, 2016; Lendon, 2016; Roy et al., 2015), translating to fewer research opportunities.

This study begins to fill an empirical gap in the present literature by examining the experiences of a domain of teachers who were missing from the research. Additionally, the present study also unveiled how these experiences shaped military instructors' perspectives on students' use of BYOD in their classrooms. The findings of this study correlate with previous research on civilian teachers who support and object to BYODs in the classroom, as this group shared similar perspectives, endorsements, and concerns of participants in prior research. This study also included the added dynamic of how military instructors adapted to student device use in their formerly teacher-centered classrooms, which contributed to several practical implications.

Since these study results were harvested from a technology-rich training program, recommendations for further military student BYOD research include other high-technology environments such as satellite communications and medical equipment training programs, to name a few. As mentioned, the integration of student-BYODs into the military training domain is very limited when compared to the civilian educational enterprise; therefore, opportunities for further exploration are vast. The rationale for initially targeting other technology-centric military programs for future research is the characteristic of instructor adaptability which served as a catalyst to a successful student-BYOD transition. This population's ability to adapt to student technology was enabled in part by the instructors' well-developed technical competency. Understanding and engaging student device connectivity challenges and software variations in their classrooms was a component of their previously obtained skillsets; therefore, most of their adaptability was focused on migrating from group-paced teaching to student-centered

interventions. Studies which target military training programs whose faculty do not possess strong technology backgrounds may be challenged by additional instructor adaptability variables.

Practical Implications

This study examined the experiences of military instructors in order to better understand how those experiences impacted their ability to establish and sustain student collaboration and discourse within their classrooms. Analysis of the participant information revealed themes which uncovered practical implications that can be applied by military instructors, institutional leaders, and policy developers to improve the experiences of instructors who are assigned to courses which employ student BYODs in their classrooms.

Military instructors. The findings of this study indicated that participants who were most successful in leveraging student BYODs within their classrooms were those who committed to adapting their teaching methods to this new environment. Since these teachers were all migrants from a group-paced instructor-centered formation to a student-centered, device-enabled course design, their initial transition was profound. Collaborative mobile learning has often been misunderstood as curriculum disseminated to students for self-directed learning in absence of teachers (Stahl, Koschmann, & Suthers, 2006). While posting content on a learning management system provides curriculum and references for students, it does not provide the instructor-mediated collaborative structure nor opportunities for classroom discourse. Since that mediation is centered on individual student needs and abilities, the participants consistently reported that planning learning events was more challenging than in their previous instructor-centered classrooms. Self-paced learning abolished their control over the sequence, rate, and student discovery of new content. Since the instructors' role shifted from the lone expert at the podium to roaming classroom mentor, their lesson planning and delivery

transitioned from proactively directive to reactively interventional. The interviews and focus groups concluded that instructor adaptation was a core characteristic for success in transitioning to and sustaining a military student BYOD classroom. These findings have practical implications to instructors who are reassigned to BYOD-enabled training programs, or for those who are assigned to institutions planning a migration to self-paced BYOD delivery.

Military institutional leaders. The previous research on student device implementation emphasizes the complexity of integrating learning with technology (Koschmann, 2017). The participants of this study felt that the transition from knowledge gatekeepers to educational interventionists was an overwhelming experience for several of their peers, who believed they were working themselves out of a job. However, the findings indicated that the change required instructors to broaden their skills to enable student collaboration and interventions. In lieu of adapting to student BYOD-use, these instructors elected to resign, transfer, or retire. As a result of these experiences, institutional leaders will need to carefully consider professional traits such as flexibility and adaptation when screening candidates for instructor vacancies within BYOD-enabled programs. In addition to assessing future faculty, the study findings also suggest that leaders establish support systems for their current staff.

Instructor communities of practice can serve as a vehicle for sharing institutional BYOD migration experiences and strategies. Recent studies echo this recommendation by encouraging faculty coaching and strong leadership to support their institutional teams through these transitions (Bouwmans, Runhaar, Wesselink, & Mulder, 2017; Toth & Sousa, 2019). Several early adopter participants mentioned that brainstorming with their peers often yielded additional ideas to further improve their environments. Leadership-sponsored learning communities can

provide an instructor forum for peer support, group problem solving, and advertising successful BYOD implementation strategies.

Policy developers. The findings of this study also have implications for institutional policy writers who develop guidance to sustain the soundness of their programs. Their emerging challenge is to synthesize leadership intent with student-centeredness and instructor formation to shape governance supporting implementation of the SecDef's Force of the Future (Carter, 2015). The study participants encouraged the continued expansion of student BYOD connectivity within their classrooms. They felt that access to instant messaging, discussion boards, and research applications would further encourage student collaboration and discourse. Toward this goal, I would recommend that policy developers consider a hybrid system of on-line access while judiciously mitigating risks of student and peer on-line distractions. A hybrid approach should also integrate the development of students' face-to-face listening skills and interpersonal communication in parallel with their BYOD-use to strike a balance across a bounded continuum of connectivity and constraints. In addition to maturing student administration policy, the study participants also provided insight into the need for aligning instructor pre-service training with emerging BYOD environments.

The study participants emphasized their unpreparedness for teaching in a student-centered classroom which integrated BYODs. Prior to their transition, the instructors had mastered their lesson plans, controlled student time on tasks, group-paced their students' learning, and regulated the length of their course. This classroom ecosystem was reinforced by instructor evaluation criteria which required positive control of a classroom within episodic, group-paced, and time constant instructional criteria (Suit et al., 2015; U.S. Air Force, 2003; U.S. Army, 2018; U.S. Navy, 2010). Participants revealed that instructor evaluation results were

associated with professional worth, and that once assigned to a BYOD domain, they felt their value was redefined. Based on these study results, I would recommend that policy makers craft new criteria for instructor training which prepares instructors to serve as facilitators, mentors, and learning interventionists. Initial instructor training should mature to include skills development in student-centered collaboration, discourse, and the planning required to effectively leverage student BYODs. I would also recommend that instructor evaluation criteria evolve by assessing teachers not as gatekeepers of knowledge, but rather as mediators for students engaged in rigorous development of their skills, knowledge, and abilities. Finally, for training programs which contain teaching practicums, I would recommend that policy developers consider requiring the rotation of new instructors through student-centered BYOD-enabled courses.

The theoretical, empirical, and practical implications of this study may inform leadership decisions regarding the implementation of student device policies, the preparation of military instructors assigned to institutions which permit student device use, and recommendations for continued examination.

Delimitations and Limitations

This study's delimitations included potential participants who served as a military technical training instructors and experienced the use of student BYODs in their classrooms. Participants with these experiences were selected from a pool of current instructors, former instructors reassigned to other institutional positions (e.g. curriculum writers, instructor supervisors, etc.), or former instructors now employed elsewhere. Additionally, the IRB approval process constrained the participant pool to non-active duty instructors at the institution; therefore the study participants were current DoD civilian employees assigned to the institution

or former instructors who previously served as active-duty teachers at the institution. While a few DoD institutions have implemented student BYODs to various degrees, the site selection was narrowed to a single institution which fully operationalized the use of student BYODs within their classrooms. This study inquired into participants' experiences in teaching military training courses which integrate student-owned devices into their classrooms, therefore any potential participant who did not possess these experiences was not considered.

My selection of the qualitative research method and a transcendental phenomenological design has limitations (Moustakas, 1994). This method allowed for the representation of reality through the eyes of the participants to share their stories and hear their voices (Creswell, 2013; Marshall & Rossman, 2006; Patton, 2002); therefore, the sample size was smaller than those of quantitative studies (Patton, 2002). Additionally, this method required that I serve as the instrument for data collection and analysis, which has the accompanying risk of researcher bias. While I have never worked for the institution nor with the study participants, I serve as an educational leader at a different DoD technical training institution and have an interest in the successful implementation of student BYODs across this enterprise. To mitigate researcher bias, I made every attempt to bracket my thoughts and feelings by documenting them prior to conducting my interviews and focus groups. During those exchanges with participants, I also strived to execute the protocols without becoming involved in participant discussions.

This study is also limited in the transferability of its results due to the single site selection in the southeastern United States. Also, the study is limited in its results due to the delimitations in the study sample. While approximately 50% of the potential participant pool at the institution are active duty military instructors, that population was excluded from the study. The sample further limited the results since all participants were male and Caucasian. These limitations

occurred because the two female teachers assigned to the institution had not yet transferred into BYOD courses, and potential participants representing other ethnicities were unresponsive to study invitations. While the participant ages and experience levels were varied, their BYOD experiences were consistently positive barring one participant who expressed mild dissention. A more demographically diverse sample consisting of varying attitudes toward teaching with student BYODs would have increased transferability of the study results.

Recommendations for Future Research

This study focused on the experiences of military instructors who leveraged student-owned devices in their classrooms at a technical training institution in the southeastern United States. Considering the delimitations, the limitations, and the findings of this study, there are several recommendations for future research.

One of the delimitations of this study was the focus on DoD civilian military instructors. Future research which widens the participant pool to include active-duty military instructors, females, and instructors with negative experiences or attitudes about student BYODs could add to the findings. Additional research could generate new findings which may provide insight into improving those experiences and attitudes. A similar delimitation occurred with the site selection. As more DoD technical training institutions migrate to the use of student BYODs within student-centered classrooms, additional research across the breath of the DoD training enterprise may also add to the findings.

Since this study used a qualitative design, and considering that military instructors have been underrepresented in research, quantitative research would add to the body of literature. While this study revealed several instructor characteristics which were associated with sustaining military student collaboration and discourse in BYOD classrooms, quantitative research would

help to identify those character traits most significant to success in these environments and which contribute to positive instructor experiences.

Summary

The purpose of this transcendental phenomenological study was to describe the experiences and to hear the voices of military instructors who leverage student BYODs in their teaching practices within an enlisted DoD training institution located in the southeastern United States. There were delimitations which narrowed the pool of potential participants and the choice of available sites. The study's limitations restricted the sample size, the population demographics, and the participant attitudes. This group of participants was selected because they are underrepresented in the previous literature. The location was chosen because it has fully integrated the use of student BYODs within the curriculum of several blocks of instruction. The participants' descriptions of their experiences within the BYOD environment at their institution were analyzed to reveal four themes which answered the research questions: adopting a BYOD culture, student primacy, BYOD instructor attributes, and learner ownership. The participants' perspectives and attitudes on BYOD-use were generally positive following their initial transition into a student-centered learning environment. Understanding the perspectives of military instructors who teach in a student BYOD environment is important because the device use may support teaching strategies to enable learning through student collaboration and discourse (Howlett et al., 2016; Mezirow, 1998).

Of the key findings, most of the participants believed that the professional characteristics of adaptation and flexibility were the enablers which facilitated their successful transition from a teacher-led to a student-centered BYOD classroom. While their migration between these environments presents as natural, the participant experiences were profound. In several cases,

they reported peer teachers who elected to resign, transfer, or retire in lieu of instructing in this changed environment. Institutional leaders would benefit from applying these findings to their hiring and placement of instructor candidates into programs which integrate or are transitioning to student BYOD-use. The findings also indicate that leaders who establish communities of practice will provide forums for their instructors to share lessons learned and strategies to support discourse through student devices.

Another significant finding involved the updating of the military instructor development programs to better prepare new teachers for a student-centered environment. Most participants felt unprepared to teach in an environment which required that they share control of learning with their students. This condition contributed to loss of teaching confidence and high stress levels associated with student BYODs. The results support an enterprise-wide assessment and update of how new instructors are selected, trained, developed, evaluated, and supported through their continuum of experience. Benjamin Bloom's (1984) perspective on teachers' training in the proper use of textbooks could be applied to the findings of this study on student BYOD-use: it is not the technology; it is what you do with it.

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APPENDIX A: IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

December 7, 2018

Scott Migdalski
IRB Approval 3459.120718: Investigating Military Instructors' Experiences with Students' Use of Personal Technology: A Phenomenological Study

Dear Scott Migdalski,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Your study falls under the expedited review category (45 CFR 46.110), which is applicable to specific, minimal risk studies and minor changes to approved studies for the following reason(s):

> 6. Collection of data from voice, video, digital, or image recordings made for research purposes.
>
> 7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt.)

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

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APPENDIX B: Instructor Questionnaire

General Instructions: The purpose of this questionnaire is to examine your attitudes toward the integration information technology into military education and training. The questionnaire consists of five sections. Each section begins with some directions pertaining to that part only. As you begin each section, please read the directions carefully and provide your responses candidly in the format requested.

Section (1): **ATTITUDES TOWARD TECHNOLOGY**

Instructions: Please indicate your reaction to each of the following statements by circling the number that represents your level of agreement or disagreement with it. Make sure to respond to every statement.

ATTITUDES TOWARD TECHNOLOGY	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers do not scare me at all	1	2	3	4	5
2. Computers make me feel uncomfortable	1	2	3	4	5
3. I am glad there are more computers these days	1	2	3	4	5
4. I do not like talking with others about computers	1	2	3	4	5
5. Using computers is enjoyable	1	2	3	4	5
6. I dislike using computers in teaching	1	2	3	4	5
7. Computers save time and effort	1	2	3	4	5
8. Schools would be a better place without computers	1	2	3	4	5
9. Students must use computers in all subject matter	1	2	3	4	5
10. Learning about computers is a waste of time	1	2	3	4	5
11. Computers would motivate students to study more	1	2	3	4	5
12. Computers are a fast and efficient means of getting information	1	2	3	4	5
13. I do not think I will ever need a computer in my classroom	1	2	3	4	5

14. Computers can enhance students learning	1	2	3	4	5
15. Computers do more harm than good	1	2	3	4	5
16. I would rather do things by hand than with a computer	1	2	3	4	5
17. I would avoid computers as much as possible	1	2	3	4	5
18. I would like to learn more about computers	1	2	3	4	5

Section (2): **INSTRUCTIONAL ENHANCEMENTS**
Instructions: Please indicate your reaction to each of the following statements by circling the number that represents your level of agreement or disagreement with it. Make sure to respond to every statement.

INSTRUCTIONAL ENHANCEMENTS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19. Computers will improve education	1	2	3	4	5
20. Teaching with computers offers real advantages over traditional methods of instruction	1	2	3	4	5
21. Computer technology cannot improve the quality of students learning	1	2	3	4	5
22. Using computer technology in the classroom would make the subject matter more interesting	1	2	3	4	5
23. Computers have no place in schools	1	2	3	4	5
24. Computer use fits well into my curriculum goals	1	2	3	4	5
25. Class time is too limited for computer use	1	2	3	4	5
26. Computer use suits my students learning preferences and their level of computer knowledge	1	2	3	4	5
27. It would be hard for me to learn to use the computer in teaching	1	2	3	4	5

28. Computers complicate my task in the classroom	1	2	3	4	5
29. Computers have proved to be effective learning tools worldwide	1	2	3	4	5
30. I have never seen computers being used as an educational tool	1	2	3	4	5

Section (3): **PERCEPTIONS OF THE IMPACT OF EDUCATIONAL TECHNOLOGY ENHANCEMENTS**

Instructions: Please indicate your reaction to each of the following statements by circling the number that represents your level of agreement or disagreement with it. Make sure to respond to every statement.

PERCEPTIONS OF THE IMPACT OF EDUCATIONAL TECHNOLOGY ENHANCEMENTS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
31. Computers will not make any difference in our classrooms, schools, or lives	1	2	3	4	5
32. Students need to know how to use computers for their future jobs	1	2	3	4	5
33. Students prefer learning from teachers to learning from computers	1	2	3	4	5
34. Knowing about computers earns one the respect of others	1	2	3	4	5
35. Computers will improve our standard of living	1	2	3	4	5
36. Computers are proliferating too fast	1	2	3	4	5
37. People who are skilled in computers have privileges not available to others	1	2	3	4	5
38. Computers will increase our dependence on foreign countries	1	2	3	4	5
39. There are other social issues that need to be addressed before implementing computers in education	1	2	3	4	5
40. The increased proliferation of computers will make our lives easier	1	2	3	4	5

41. Computers dehumanize society	1	2	3	4	5
42. Working with computers does not diminish people relationships with one other	1	2	3	4	5
43. Computers encourage unethical practices	1	2	3	4	5

Section (4): **ACCESS TO TECHNOLOGY**
Instructions: Please identify how often you have computer and internet access in the following contexts.

ACCESS TO TECHNOLOGY	Daily	2 or 3 times a week	Once a week	Once a month	Never
44. In your home	1	2	3	4	5
45. At school (computer lab or library)	1	2	3	4	5
46. Other (like internet at Starbucks, McDonald's, Internet cafes, etc.)	1	2	3	4	5

Note. Adapted from A. Albirini (2006). Computers & Education 47, 373–398, and Thompson, J. (2017). *Examining student and teacher attitudes of education technology and perceptions of each other* (Order No. 10267127). Available from ProQuest Dissertations & Theses Global. (1914914301).

Section (5): **DEMOGRAPHIC INFORMATION:**
Instructions: Please indicate your response to the following questions by checking the appropriate boxes:

What is your gender?

- ☐ Male
- ☐ Female

What is your age?

- ☐ 20–29
- ☐ 30–39
- ☐ 40–49

Including the current year, how many years have you been teaching?

- ☐ <3 Years
- ☐ 3–5 Years
- ☐ 6+ Years

Have you ever attended any training course, workshop, or seminar on using computers?

- ☐ No
- ☐ Yes

What is the teaching method you use most often?

- ☐ Active discussion
- ☐ Collaborative activities
- ☐ Demonstration
- ☐ Hands-on learning
- ☐ Lecturing
- ☐ Role playing
- ☐ Computer-assisted instruction (ex. Canvas, etc.)
- Other (please specify):

What was your branch of Service (USA, USAF, USN, USMC, USCG) while assigned as an instructor?

- ☐ U.S. Army
- ☐ U.S. Air Force
- ☐ U.S. Navy
- ☐ U.S. Marine Corps
- ☐ U.S. Coast Guard

Rank?

Service Lead?

Program Director?

(END INSTRUCTOR SURVEY)

APPENDIX C: Recruitment Letter

Dear [Recipient]:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Education degree. The purpose of my research is to investigate how military instructors describe their experiences when incorporating student-owned devices into teaching and learning activities, and I am writing to invite you to participate in my study.

If you are 20 years of age or older and serving as an instructor assigned to teach the [redacted] course, which employs the use of student-owned devices within the teaching/learning environment, and are willing to participate as a private citizen, away from the government installation, using your private e-mail address, during off-duty hours, and without the use of government resources, you will be asked to complete a questionnaire. Following my receipt of your completed questionnaire, you may be selected to participate in a recorded interview and focus group. In addition, you may also be asked to review transcripts of both the interview and focus group. It should take approximately 10 minutes to complete the questionnaire, 45 minutes to participate in the interview, 45 minutes to participate in the focus group, and 60 minutes (each) to complete the transcript reviews for the interview and focus group. Your name will be requested as part of your participation, but the information will remain confidential.

A consent document is attached to this email and contains additional information about my research. To participate, please review, sign, and return the consent document to me using your personal e-mail at: stmigdalski@liberty.edu

Once I receive your signed consent document, I will send you an e-mail to your personal e-mail address containing the study questionnaire with instructions for completing and returning the questionnaire.

Sincerely,

Scott Migdalski, Ed.D. (Candidate)
Liberty University
stmigdalski@liberty.edu

APPENDIX D: Informed Consent Form

CONSENT FORM

Investigating Military Instructors' Experiences with Students' Use of Personal Technology: A Phenomenological Study

Scott Migdalski Liberty University School of Education

You are invited to be in a research study of military instructors' experiences with students' use of personal technology. You were selected as a possible participant because of your instructor experience in the [redacted] course which employs a flipped classroom design and leverages student owned devices within the teaching and learning environment. Please read this form and ask any questions you may have before agreeing to be in the study.

Mr. Scott Migdalski, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this study is to describe the experiences of military instructors (who are participating as private citizens) who leverage student-owned devices (tablets, laptops, etc.) in their teaching practices within a military training institution. The literature citing the use of student devices within military training is rare, focused on student outcomes, and not inclusive of instructor experiences. The focus of my inquiry is to examine if student's use of personal devices to meet training objectives has inspired military instructors to modify their teaching practices to establish and sustain a collaborative learning environment.

Few military classrooms are leveraging student-owned technologies, while others have elected to not introduce the devices into the teaching environment. This study may serve to inform military training stakeholders (instructors, curriculum developers, institutional leaders) who are exploring the potential of student owned devices for their schools because of the value of collaboration and discourse within the military training environment. Additionally, the results and conclusions of this study may also inform leadership decisions regarding the implementation of student-owned device policies, and in the preparation of military instructors assigned to institutions which permit student device-use.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. Complete an Instructor Questionnaire estimated to take 10 minutes.
2. If selected, participate in an audio-recorded Interview estimated to take 45 minutes.
3. If selected, participate in a transcript review following the Interview estimated to take 60 minutes.
4. If selected, participate in an audio-recorded Focus Group estimated to take 45 minutes.
5. If selected, participate in a transcript review following the Focus Group estimated to take 60 minutes.

Risks: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

Benefits: Participants should not expect to receive a direct benefit from taking part in this study.

Compensation: Participants will not be compensated for participating in this study.

Confidentiality: The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a participant. Research records will be stored securely, and only the researcher will have access to the records. I may share the data I collect from you for use in future research studies or with other researchers; if I share the data that I collect from you, I will remove any information that could identify you, if applicable, before I share the data.

- Study participants will be assigned a pseudonym. Additionally, I will conduct the interviews and focus groups in a location where others will not easily overhear the conversation.
- Digital data will be stored in password locked files on a password locked computer for three years after the study. During this period, the data may be used in future presentations. Hard copy study data will be stored within a locked file cabinet. After three years all electronic and hard copy records will be deleted.
- Interviews and focus groups will be recorded and transcribed. Recordings will be stored on a password locked computer for three years and then erased. Only the researcher will have access to these recordings.
- I cannot assure participants that other members of the focus group will not share what was discussed with persons outside of the group.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

How to Withdraw from the Study: If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you, apart from focus group data, will be destroyed immediately and will not be included in this study. Focus group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Contacts and Questions: The researcher conducting this study is Mr. Scott Migdalski. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact him at stmigdalski@liberty.edu. You may also contact the researcher's faculty chair, Dr. David Holder, at deholder@liberty.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record me as part of my participation in this study.

Signature of Participant Date

Signature of Investigator Date

APPENDIX E: Sample Interview Transcript

Question #5: Describe how students' devices impacted collaboration in your classrooms.

Scott Migdalski: Yeah. Let's focus on student collaboration. How did the student's devices impact collaboration in your classroom?

Daniel: That's interesting. In the past they weren't able to do any type, or bring any type of electronic equipment into the classroom. Their own, PC's, their own tablets, whatever the case might be. However, now, they are. What we find as instructors is, as we're lecturing, they're utilizing their device and they're taking notes, and highlighting whatever it is the material that they've got. But we also find that some of them would go back to the dorms and look up some of the information, and bring back something that relates to that particular topic. Which is great. Because it presents an active learning environment, in which other students within that classroom will then contribute. "Oh, yeah, I saw that sunspots affects communications in some way. I went to adoublel.org the other night and I found that sunspots are actually happening now. So, sir, how does that impact Comm?"

That collaborative effort within the class, and that active learning environment, really brings something to the table. Versus, in the passive environment, I say passive because it was me lecturing, it was basically whatever I experienced, whatever I learned, I was presenting to the students. There was very little back and forth from the student's part, unless I had planted it there as an instructor.

Because you always want to try and bring some sort of collaborative effort between the students and the classroom. So you would drop a subject matter you know they're familiar with, and allow that collaboration to take place. But that didn't happen as often as it does now.

Question #9: Describe how student devices impacted productive discourse in your classrooms.

Scott Migdalski: Oh, okay. Good, thank you. We're going to transition now into discourse, How have the student devices impacted productive discourse in the classroom?

Daniel: I mentioned it earlier, it brings forth some active learning. It brings forth some active conversations and healthy conversations that maybe, may not have taken place, if technology wasn't brought into the classroom. A lot of this, in the past, was relying on the instructor to bring forth these questions and hope that with this topic I bring forth, this will have some collaboration between students.

"No, I saw this. No I saw this." But with the ability to bring technology in the classroom, and even more so in the future, when we allow them to go out to the internet, and bring information in. Now, it's limited to them going back to the dorms, or to their homes and looking up information. In the future, when we allow them to reach out to the network, to YouTube, those sort of places, they bring more of that conversation, that active learning, across students. I think it would be even more so.

It does transpire now. "I read last night, in the study guide workbook, that this is how I interpret things. Well this is not how I interpret things. Oh, okay, which one of you done the research? Well, none of us. Well somebody go do the research." So they'd go back to the dorms, or back to their homes and they'll actually go out on the internet, do some research, download the information into their tablets, or laptops, and then they bring that discussion back to the class.

So there's a lot of active discussion, active learning transpiring, because of these devices in the classroom. Would it have happened if we rolled back time 20 years? Would they have done the research from a library like I did when I was a young guy? I certainly don't think it would transpire as often as I would like it to have transpired. With technology in the classroom, and their ability to do some research it does bring forth some spontaneous conversations, a lot of active learning, but also some disagreements.

"Well, that's not how interpreted it. Ah, that's interesting that you don't interpret that way, but you interpret it that way, tell me why?" And then, as an instructor I can redirect all of that. "Well, what do you think? Well, sir, I don't know. Well, perhaps you should do some research, too." Then it just brings forth a very positive environment, I think. Very valuable training.

Scott Migdalski: Did it [BYOD] encourage that discourse?

Daniel: Absolutely, absolutely. And even more in the future, I think. But, right now, under the limited opportunities that students have in the classroom, they're able to bring their devices, and they're able to do some research from their dorms and homes. They bring that information to the classroom, but actually, doing that research, within the classroom, within the duty day, isn't quite allowed yet. But we're moving to that.

APPENDIX F: Sample Focus Group Transcript

Focus Group Question #1: What motivated you to become an instructor?

Scott-Moderator	What motivated you to become an instructor?
Edward:	This is [Edward], I was the pipeline instructor during Vietnam and I'm in the second class and so I left the [REDACTED] and went to school and I always loved what I did in the classroom [inaudible] and so I came back.
Chris	That's a good thing, [Edward] didn't stay away. We didn't have some [Edward] and stuff, we would have been shot in the foot.
Chris:	This is [Chris], my desire to become an instructor actually started when I went through [REDACTED] and I remember block five for building servers. I had an instructor, his name was [inaudible]. I remember just thinking to myself how much he knew how well he was able to articulate it related to a real job and not make it quite so cold of the learning experience. That was kind of the pivotal moment for me, and from then on I was invested in what I thought our career fields should be. Over time I noticed that you end up with a varying degree of pedigree that comes out of the school house.
Scott-Moderator:	[Bryan], you were started as a trainee in college.
Bryan	Yeah, so this is [Bryan]. I was 19 and needed a job, needed a good one that worked with a college, and so I was offered a ... Actually, I was told to go apply for an internship and I started teaching in ... I was through with computer engineering major at the time and I started teaching in the [REDACTED] Department, and I don't know if it was at the right time right place or how the stars aligned or what, but they put me in the flight that brought in the first smart board.
Bryan	I got to be in a very cool environment because [REDACTED] is a different breed. Then working with new technology the [REDACTED] hadn't seen yet… it grabbed me, I enjoyed it and I stayed on and 20 years later here I am.
Scott-Moderator:	With [Anthony], I recall that it was his love of history which influenced his decision
Anthony	Right, this is [Anthony] back in school 30 something years ago. I was involved in a civil war reenacting unit and a light blend, it was the same, enjoying the ability to share knowledge with people about things that I knew about. I would volunteer every time we'd have a battle after battle is

over, we have crowd duty where we'd have to go stand out on the battlefield and share the details about the canons or the tents or the camp life whatever it was and I found myself volunteering for that at every reenactment that we did. Then fast forward when I came through tech school, I actually had started asking the supervisor where I could become a pipeline instructor.

APPENDIX G: Excerpt from Reflexive Journal

12-27-18: Questionnaire and Interview preparation to pilot
Received IRB Approval on 7 Dec 18 and Planning for Questionnaire and Interview Piloting in January 2019. Interview Planning reflections: 1. Use recruitment information (Use previous reflections and document new impressions). 2. Prepare a separate page for field notes for each participant – use this data for later entry as "notes" within data file for NVivo. Don't interrupt responses. Include interview setting, environmental location, time, weather, etc. Include initial reflections (during interview, after interview). Initially review descriptions of collaboration and discourse – Lenses. 3. Review purpose of study: Capture experiences of instructors who leverage student devices in the classroom. The design of this study does not begin with a premise or hypothesis, but rather uses learning theory as a lens to capture emerging themes of instructor experiences – it's capturing the instructors voice – not my interpretation of that voice. Participant identities remain confidential yet on review of the published study they may be able to recognize their personal comments expressed as pseudonyms.

12-29-18: Reflections on preparing for epoché through the intended use of NVivo for data coding
Use of NVivo may support my epoché in terms of initially focusing on use of software vs. what I'm thinking about at the time of data upload, memoing, annotation, and coding. Use the software and my focus on gaining proficiency. Feels like the creation of a veil between my random thoughts and attitudes about the data and my efforts to "process" the data via NVivo

1-4-19: Preparation for interviews in Jan 19
Listened to Dr. Jill Jones Podcast on interviewing – Liberty Podcasts. Takeaways: Avoid interrupting, avoid citing literature and studies to avoid leading the participant. Avoid non-verbal clues which could lead participant responses (nodding head, smiling, hand gestures, etc.) 'The right and the wrong interview"

1-5-19: Reflections while preparing for participant face-to face recruitment
As I prepare for the participant recruitment phase – the initial instructors/staff breakfast meetings scheduled for the 1st and 3rd Thursdays of the month in [REDACTED], I'm imagining and wondering about what type of instructor pre-service training would suffice to support an instructor's ability to establish and sustain and environment of collaboration and discourse within a military technical training classroom which employs student BYODs. Continued: Are their areas which contradict in the literature on collaboration facilitated by instructors? Discourse contradicted by the literature? Formation of teachers who will work in BYOD environments?

1-17-19 (5:40 PM): Reflections during preparation of first Interview.
Waiting in lobby in [REDACTED] for 1st Interview, beautiful evening, 50 degrees, pretty area for leased office space, a few technical problems but nothing to corrupt interview. Prepared recordings, seating, agenda, scheduled for 6PM. Stay focused on agenda. Caution on non-verbal cues. Stay within phenomenology lens. Seek and hear the voice of experiences, Let recorder capture details, later the transcript. Attend to the participant. Clear and professional thoughts. Don't multi-task. Just relax and focus on participant's words.

2-21-19 (7:05 AM): Reflections during preparation of fourth Interview.
Cold damp weather for [REDACTED]. 65 degrees and rain for the past week. Will meet participant in lobby at 7:30AM of rented meeting space. Still ruminating on difficulty of prospective participant response rate and speed. Ensure that no context of professional position is surfaced. Still challenged by back pain following return travel, and uncomfortable. Very optimistic and excited about interview. Reviewed "preparation for interview notes" to focus on participant responses, avoid cues, let the recorders and transcription do the data collection – do not multi-task.

3-14-19 (9:25 AM): Reflections during preparation of first Focus Group
Warmer and brighter in {REDACTED] than my visit last month. Preparing for a visit from first participant focus group at 11:15 during participant lunch break. Set up meeting room and included snacks for physical participants. Also plan to have at least one participant via Skype, so checked the connectivity. Brought snacks and drinks with me for this session. This is first Focus Group so use prepared notes as guideline to include purpose: build on individual interviews by sharing personal experiences while questioning each other's responses across a diverse population (age, experience levels, current or former instructor) within common phenomenon. Remember to introduce their comments with names for transcriber. Thank them for participant referrals. Focus on dialogue, avoid cues, don't multi-task, (2) recorders and transcripts will take care of the data recording. Mediate but don't interrupt.

APPENDIX H: Excerpt from Audit Trail

7-Dec-18: Received Liberty University IRB Approval to Conduct Research

5 Jan – 10 Jan 2019: Piloting Questionnaire with Current/Former Instructors (not participating in study) for Feedback

Piloting planned to occur (1) via e-mail/telecon and (2) concurrent with visit to off-duty, off- site, bi-monthly instructor breakfast socials in [REDACTED]

5&10 Jan 19: Piloted Questionnaire with (2) Former Instrs via e-mail to validate e-mail introduction of questionnaire, how to complete, and return worked OK. Also Collected FB on the usability. Observations: Instrument adapted from Albirini is 2006 reference and asks a few questions which seem antiquated. Recommendations include adding a caveat statement to the e-mail text which carries the questionnaire -- Caveat: This instrument was published in 2006 and survey questions may present as antiquated. On questionnaire itself, pilot replies to "demographics section" were not annotated IAW the instructions, "below auto-formatted text", therefore NVivo would not be able to decipher the Stem and the supplied response. Recommendation to emphasize in instructions - for participant to place response below the stem within the questionnaire. After reviewing the IRB-Protocol, these changes will not impact the parameters of the submitted protocol

Piloting Interview Process and Questions w/Current/Former Instructors (not participating in study) for Feedback

16-Jan: Interview Piloted with former instructor/non-participant at site of leased office space which will serve as one of the intended sites for Participant Interviews: Question 4 assesses participants reaction to being asked to participate in the study, and feedback recommends moving that question to the end of the interview. Felt that relocating question would permit participant reflection on collaboration and discourse questions when answering about experience of participating in the interview

8 Jan - 20 Jan 2019: Partic return Invitations
(Prepare e-mail with Questionnaire attachments)
(Staggered Issue and receipt of consent documents depending on participant response to invitations)
(Schedule location for Interv's)

13 Jan - 30 Jan 2019: Questionnaires Issued
(E-mail Questionnaires (~36) to all positive invite returns IAW Proposal)
(Staggered Issue and receipt of consent documents depending on participant response to invitations)
(Schedule location for Interv's)

13-Jan: First Questionnaire Issued.

14 Jan – 30 Jan 2019: Questionnaires returned
(Determine most diverse/intense responses and participants; gender, civ/mil rank, age to schedule interviews)

14-Jan: First Questionnaire Returned.

17 Jan – 20 March 2019: Interviews Scheduled Post-Pilot
(Sched ~14 interview sessions with current/former instructors)

17-Jan Potential Partic #1 Scheduled for 17 Jan

17 Jan – 22 March 2019: Interviews/Focus Groups/Transcripting/Member-Checking Conducted
(Use Field Journal to capture/bracket personal perceptions, preconceptions)
(Plan to lease Hotel Office. "Google Hangouts" has been used by others in cohort.

17-Jan: First Interview Conducted at leased office space in [REDACTED]. Transcribe/Summarize from Field Notes Book - Forward File recordings to [REDACTED] for transcripts

18-Jan: Interview Conducted at leased office space in [REDACTED]. Transcribe/Summarize from Field Notes Book - Forward File recordings to [REDACTED] for transcripts

18-Jan – 22 Mar: Interviews, Focus Groups, and Transcripting

APPENDIX I: Instructor Questionnaire Results

Note. Participant responses are indicated in each box correlating to the prompt in its row. The letters A–L represent the first initial of the instructor participants (e.g., A=Anthony; B=Bryan).

Section (1): **ATTITUDES TOWARD TECHNOLOGY**

ATTITUDES TOWARD TECHNOLOGY	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers do not scare me at all					A,B,C,D,E,F,G,H,I,J,K,L
2. Computers make me feel uncomfortable	A,B,C,D,E,F,G,H,I,J,K,L				
3. I am glad there are more computers these days			L	I,J,K	A,B,C,D,E,F,G,H
4. I do not like talking with others about computers	A,B,C,E,H	B,F,G,I,J,K		L	
5. Using computers is enjoyable				F,G,H,I,K,L	A,B,C,D,E,J
6. I dislike using computers in teaching	A,B,C,D,E,F,H	G,I,K	J,L		
7. Computers save time and effort				B,H,J,K,L	A,C,D,E,F,G,I
8. Schools would be a better place without computers	A,B,C,D,E,F,G,H	J,K,L		I	
9. Students must use computers in all subject matter	H,J,L	B,C,F,G,K	A,D,I	E	
10. Learning about computers is a waste of time	A,B,C,D,E,F,G,H,I,J,K,L				
11. Computers would motivate students to study more		K	B,I,J,L	A,D,E,G,H	C,F
12. Computers are a fast and efficient means of getting information				G,H	A,B,C,D,E,F,I,J,K,L
13. I do not think I will ever need a computer in my classroom	A,B,C,D,F,G,H,I,K,L	E,J			
14. Computers can enhance students learning		K		I,J	A,B,C,D,E,F,G,H,L

15. Computers do more harm than good	A,B,C,D,E, F,G,H	J,L	I,K		
16. I would rather do things by hand than with a computer	C,E,G,J	B	A,D,H,I,L	F,K	
17. I would avoid computers as much as possible	A,B,C,D,E, F,G,J,L	H,K	I		
18. I would like to learn more about computers		K	L	E,F,G,I	A,B,C,D, H,J

Section (2): **INSTRUCTIONAL ENHANCEMENTS**

INSTRUCTIONAL ENHANCEMENTS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
19. Computers will improve education				B,G,I,J,K	A,C,D,E, F,H,L
20. Teaching with computers offers real advantages over traditional methods of instruction			A,D,I,J	G,H,K,L	B,C,E,F
21. Computer technology cannot improve the quality of students learning	B,C,F,G, H,L	E,I,J,K		A,D	
22. Using computer technology in the classroom would make the subject matter more interesting			A,D,H,I	F,G,J,L	B,C,E,K
23. Computers have no place in schools	A,B,C,D,E,F, G,H,I,K,L	J			
24. Computer use fits well into my curriculum goals			J	I,K	A,B,C,D,E, F,G,H,L
25. Class time is too limited for computer use	A,C,D,E, F,G,H	B,J,L	I,K		
26. Computer use suits my students learning preferences and their level of computer knowledge				A,D,F, G,I	B,C,E,H, J,K,L
27. It would be hard for me to learn to use the computer in teaching	A,B,C,D,E,F, G,H,I,J,K,L				
28. Computers complicate my task in the classroom	A,D,F,G,I	C,E,H,K,L	B	J	
29. Computers have proved to be effective learning tools worldwide				I,J,K,L	A,B,C,D, E,F,G,H

30. I have never seen computers being used as an educational tool	A,B,C,D,E,F, G,H,I,J,K,L				

Section (3): **PERCEPTIONS OF THE IMPACT OF EDUCATIONAL TECHNOLOGY ENHANCEMENTS**

PERCEPTIONS OF THE IMPACT OF EDUCATIONAL TECHNOLOGY ENHANCEMENTS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
31. Computers will not make any difference in our classrooms, schools, or lives	A,B,C,D,E, F,G,H,K,L	I,J			
32. Students need to know how to use computers for their future jobs				A,D	B,C,E,F, G,H,I,J, K,L
33. Students prefer learning from teachers to learning from computers	J	B,C,E,F, G,H,I	A,D,L	K	
34. Knowing about computers earns one the respect of others		H,L	A,D,F	B,E,G,I,K	C,J
35. Computers will improve our standard of living			A,B,D	F,H,I,J, K,L	C,E,G
36. Computers are proliferating too fast	E,F	B,C,G,H, I,J,K	A,D,L		
37. People who are skilled in computers have privileges not available to others		G	A,B,D,L	F,H,I,J,K	C,E
38. Computers will increase our dependence on foreign countries	A,D,E,G, H,L	B,C,F,I,J	K		
39. There are other social issues that need to be addressed before implementing computers in education	A,D,L	C,E,F,G,H	B,I	J,K	
40. The increased proliferation of computers will make our lives easier			A,B,D,K	F,D,H,I, J,L	C,E
41. Computers dehumanize society	A,D,E	C,F	B,G,H	I,J,K,L	
42. Working with computers does not diminish people relationships with one other		C,V,G,I, J,K	B,L	F,H	A,D,E
43. Computers encourage unethical practices	A,D,H	C,E,F,I,L	B,J,K	G	

Section (4): **ACCESS TO TECHNOLOGY**

ACCESS TO TECHNOLOGY	Daily	2 or 3 times a week	Once a week	Once a month	Never
44. In your home	A,B,C,D,E, F,G,H,I,J, K,L				
45. At school (computer lab or library)	A,B,C,D,E, G,H,I,J,K,L				F
46. Other (like internet at Starbucks, McDonald's, Internet cafes, etc.)	B,H	C,G,J		A,D,E,I, K,L	F

Section (5): **DEMOGRAPHIC INFORMATION:**

What is your gender?

- ☐ Male (A,B,C,D,E,F,G,H,I,J,K,L)
- ☐ Female

What is your age?

- ☐ 20–29 (C)
- ☐ 30–39 (B,H,I,J)
- ☐ 40–49 (A,D,L)
- ☐ 50-59 (F,G)
- ☐ 60 & Older (E,K)

Including the current year, how many years have you been teaching?

- ☐ <3 Years
- ☐ 3–5 Years (C,H,I)
- ☐ 5+ Years (A,B,D,E,F,G,J,K,L)

Have you ever attended any training course, workshop, or seminar on using computers?

- ☐ No
- ☐ Yes (A,B,C,D,E,F,G,H,I,J,K,L)

What is the teaching method you use most often?

- ☐ Active Discussion: (B,I,L)
- ☐ Collaborative Activities
- ☐ Demonstration: (F)
- ☐ Hands-on learning: (D,H,K)
- ☐ Lecturing
- ☐ Role playing
- ☐ Computer-assisted instruction (ex. Canvas, etc.): (C,E,J)
- ☐ Other (please specify):

What was your branch of Service (USA, USAF, USN, USMC, USCG) while assigned as an instructor?

- ☐ U.S. Army
- ☐ U.S. Air Force: (A,B,C,D,E,F,G,H,I,J,K,L)
- ☐ U.S. Navy
- ☐ U.S. Marine Corps
- ☐ U.S. Coast Guard

Rank while assigned as Instructor?

GS-09 (A,B,D,E,F,G,J,K,L)
SSgt (C,I)
TSgt (H)

Service Lead?

Yes
No (A,B,C,D,E,F,G,H,I,J,K,L)

Program Director?

Yes
No (A,B,C,D,E,F,G,H,I,J,K,L)