2015

Employing PLNs for the Self-development of Army Leaders: A Connectivist Approach

James K. Greer
Walden University

Walden University

College of Education

This is to certify that the doctoral dissertation by

James Greer

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Jennifer Smolka, Committee Chairperson, Education Faculty
Dr. Kathleen Lynch, Committee Member, Education Faculty
Dr. Christina Dawson, University Reviewer, Education Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2015

Abstract

Employing PLNs for the

Self-Development of Army Leaders: A Connectivist Approach

by

James K. Greer

MS, National War College, 1998

MMAS, School of Advanced Military Studies, 1990

MS, Long Island University, 1988

BS, United States Military Academy, 1977

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

Walden University

November 2015

Abstract

The post-9/11 security environment is one that confronts the United States, and specifically the U.S. Army, with complex problems that require development of leaders with improved knowledge, skills, and attributes to meet the challenges of defending the nation. The problem confronting the U.S. Army is that Army leaders lack a learning environment or methodology that enables effective self-development throughout their career. Research suggests that PLNs (PLNs) and a connectivist approach may address that problem, but these have been limited to civilian educational environments. This qualitative case study explored the use of PLNs with a connectivist approach for leader self-development in Army organizations. The case in this study was that of a cohort of 22 officers in a U.S. Army unit. Each officer developed a PLN and then employed a connectivist approach to connect, curate, create, and share knowledge. Data were collected using semistructured interviews and analyzed with a focus on themes that could inform future decisions by Army senior leadership on the self-development of leaders, and that could enable decisions that will reduce loss of life and destruction in wartime. The major themes developed in this study account for the approach and challenges to Army self-development, the motivation for and execution of connected learning, and the structuring and desired characteristics of self-development that employs PLNs and connectivism. Recommendations included integrating a semistructured approach to self-development into emerging educational approaches to Army leader development. More prepared Army leaders can respond to crises more effectively, reducing adverse effects, damage, and loss of life.

Employing PLNs for the Self-Development of Army Leaders: A Connectivist Approach

by

James K. Greer

MS, National War College, 1998

MMAS, School of Advanced Military Studies, 1990

MS, Long Island University, 1988

BS, United States Military Academy, 1977

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

Walden University

November 2015

Dedication

This dissertation is dedicated to the men and women with whom I have served the Nation, past, present and future, in war and in peace, and their families and friends who have supported us all. There is a saying that every generation has its heroes, and these are my heroes. If this dissertation helps even one of them to better serve the Nation, protect our citizens and our way of life, and survive – then it has been well worth the effort.

Acknowledgments

First, I would like to thank my wonderful wife Cheri. Everything I have accomplished I owe to her love, support, and patience.

Second, I would like to thank the Walden faculty and more specifically my dissertation team led by Dr. Jennifer Smolka and including Dr. Kathleen Lynch and Dr. Tina Dawson. My goal entering the doctorate program at Walden was to learn and to become a more innovative and productive educator, and the faculty here have enabled me to accomplish both objectives.

Third, I would like to thank each of the participants in this study. Army leaders are incredibly busy people and many of the respondents had just returned from an overseas deployment in which they were away from their families for more than nine months. Yet, they gave of their precious time to make this study and dissertation a reality, once again proving their dedication to selfless service.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

The U.S. Army's competitive advantage directly relates to its capacity to learn faster and adapt more quickly than its adversaries

The quotation above from the U.S. Army Learning Concept for 2015 (2011, p. 1) captures the essence of the learning challenge the Army faces in the second decade of the 21st century. In the era after the counterinsurgencies in Iraq and Afghanistan, the Army faces a myriad of complex problems potentially anywhere in the world, with possible missions ranging from peacekeeping, to humanitarian assistance, to securing nuclear weapons in rogue states. Each of these varied potential missions requires capable leaders who have 21st century competencies:: critical and creative thinking, meta-cognitive, and problem solving skills (Greenstein, 2012). The Army leadership recognized a similar requirement, noting,

> A leader of intellect has the conceptual capability to understand complex situations, determine what needs to be done and interact with others to get it done. Leaders must have the ability to reason, to think critically and creatively, to anticipate consequences and to solve problems. (Army Leader Development Strategy, 2009)

The challenge for the Army is a gap in leader development capabilities (U.S. Army, 2011). The Army has a robust institutional, "brick and mortar" leader education environment and a robust organizational leader development environment within its unit training programs. However, it lacks a robust learning environment for self-development (Falleson, Keller-Glaze, & Curnow, 2011).

For the purposes of this study, the self-development domain consists of those learning experiences outside formal schoolhouse education or unit training. The Army needs leaders who are life-long learners, and the lack of an effective self-development learning environment inhibits learning in the domain in which leaders spend the vast amount of their time. The social implication of this study is that absent effective self-development, our military leaders will be less effective decision makers and complex problem solvers, which will directly result in the loss of American lives in combat, collateral damage to civilians and property, and potential risks to the security of our citizens. This first chapter of the dissertation (a) introduces the subject, (b) provides a background, (c) describes the problem, purpose and research questions for the study, and (d) outlines the conceptual framework of the research approach.

Background

Summary of Relevant Research

My review of leadership studies conducted by the U.S. Army has demonstrated that the need for improved leader development and education is a recurring theme. The Center for Army Leadership noted that Army practice is based on the tenet that leadership can be developed (Falleson, Keller-Glaze, & Curnow, 2011). Although now more than a decade old, The Army Training and Leader Development Panel (ATLDP) was the last comprehensive study of leader development conducted by the Army. The ATLDP emphasized both the importance of leader development and the necessity of refining and developing new leader development constructs (U. S. Army, 2002). The position of senior military leaders, including that of then Chairman of the Joint Chiefs of

Staff Admiral Michael Mullen, is that the challenges of 21st Century warfare in an era of persistent conflict as experienced in Iraq and Afghanistan have demanded that military institutions determine different ways to promote, educate, and train leaders than in the past (Abbé and Halpin, 2009).

To accomplish the objective of developing the thinking skills of leaders, Army Leader development is conducted in three domains: institutional, consisting of Army resident and non-resident schools and courses; organizational, consisting of the training and experiences leaders gain in Army units; and self-development, consisting of individual learning efforts aimed at addressing the individual's learning needs that are not addressed through the other two domains (Army Learning Concept, 2011). The Army's learning domains of institutional, organizational and self-developmental are different from and not intended to relate to the Bloom's taxonomy learning domains of psycho-motor, cognitive and affective (Bloom, 2011).

The current Army education and training directives, approaches, and resources are directed at the institutional and organizational learning domains. The Army has a well-developed institutional learning program that consists of a series of schools each officer must attend throughout their career. This system is called the Officer Education System (OES). In the OES, as an officer progresses through a career he or she will spend approximately three of the first twenty years in post-Baccalaureate education. Similarly, the Army doctrine for training and leader development provides for organizational leader development experiences that are resourced through exercises and positional assignments (Field Manual 7.0, 2011). Unfortunately, Army direction, doctrine, approach, and

resourcing for the self-development domain is not as developed as the institutional and organizational domains. While recognizing the importance of self-development and individually-tailored learning, the Army says relatively about how to accomplish that objective. Similarly, leaders are charged with guiding the self-development of their subordinates but are not provided the guidance or preparation to do so. This research is aimed at exploring and describing the contribution of the self-development domain to overall leader development in the U.S. Army.

Research Gap this Study Will Address

If the Army is going to accomplish the Army Leader Development Strategy objectives of developing leaders with intellect and the ability to think critically and creatively to solve complex problems, then there must be a learning environment and a methodology for that to occur. Research into educational innovation in the civilian sector shows that PLNs (PLNs) provide an environment in which individual learning and self-development can occur (Richardson & Mancabelli, 2011; Downes, 2010; Campbell, 2012; Dunaway, 2011). Research on the emergence of connectivism indicates that civilian institutions and individuals can leverage Web 2.0 technologies to enhance learning that connects individuals and PLNs (Siemens, 2004; Bell, 2011; Dunaway, 2011; Trinova and Tran, 2012; Tschofen and Mackness, 2012). A gap in the literature on connectivism exists in that while there is robust research into the application of PLNs and connectivism to civilian learning, there is little research and literature on the application of these two theories to military education, and more specifically to the self-development of Army leaders. This dissertation will contribute to addressing this research gap.

Research Need

This study is needed to fill the education gap by helping to identify options for establishing a learning environment for the self-development of Army leaders. At the micro level, a learning environment for self-development improves individual learning, improves thinking skills, and promotes self-development. At the macro level, a learning environment for self-development enables collaborative learning which will improve the effectiveness of Army organizations. At the mega level, a learning environment for self-development produces a better educated and effective officer and non-commissioned officer corps, which can deter future wars or, if necessary, execute military operations in a manner that limits the loss of human life and the significant expenditure of the Nation's resources. This research, with its focus on employing PLNs and a connectivist approach, is needed to begin the exploration of possible approaches and their implications for addressing the gap in Army leader self-development.

Chapter 1 of this dissertation describes the background, problem statement, and purpose of the study in terms of what positive change it will inform. Transitioning to a description of the research effort, this chapter describes the research questions, the conceptual framework for the study, and the nature of this research effort as a qualitative case study. To set the foundation for understanding the conduct of the research, this chapter provides key definitions, assumptions, and the scope and limitations of the research. Lastly this chapter describes the significance of this research in terms of its contribution to the improvement of the self-development component of leader

development in the Army, and describes some of the implications not only for the Army, but for the application of PLNs and connectivism to the educational discipline.

Problem Statement

The current Army learning system is inadequate for accomplishing the strategic objective of an Army learning system that works to develop leaders with intellect and the ability to think critically and creatively to solve complex problems. This problem exists in part because Army leaders are not provided with a learning environment or methodology that they can employ for self-development during their career. While civilian innovations of PLNs and connectivism may address this problem, currently there is no research to support the application of those theories to military self-development. As a result, one of the essential components of leader development during a career cannot be executed, reducing the depth and breadth of the leader's knowledge and self-awareness (U.S. Army, 2013). The lack of learning environment and methodology will adversely impact future Army learners seeking independent learning experiences. Having grown up in the age of digital mediation, such young Army leaders habitually practice self-development and lifelong learning, and routinely practice connected and collaborative learning (U.S. Army, 2013). Young leaders will be frustrated with leader development and learn less if lack of learning environment and self-development methodology persists.

The Army fully recognizes the need to improve learning. *The Army Learning Concept for 2015* states, "The U.S. Army's competitive advantage directly relates to its capacity to learn faster and adapt more quickly than its adversaries" (U.S. Army, 2011, p.

1). Unfortunately, the Center for Army Leadership's 2011 *Survey of Army Leaders* showed that trends over the last five years indicate a deficiency in leader self-development, noting that "two-thirds of Army leaders (66%) indicate leaders in their unit or organization develop the leadership skills of their subordinates to a 'slight' or 'moderate' extent, while only one-fourth (25%) report this occurs to a 'great' or 'very great' extent" (Riley et al., p. 62)

Similarly, the recent *Army Training and Leader Development Survey* found that the Army was not providing junior officers adequate leader development experiences and that the officer education system (OES) did not provide junior officers the skills for success in full spectrum operations (Riley, Conrad, Hatfield, Keller-Glaze, & Falleson, 2011). Further, the *Army Learning Concept for 2015* (U.S. Army, 2011) described the need to transform the Army's learning model. It acknowledged the changing environment and the need to ensure we meet the learning needs of individual soldiers and leaders at echelons throughout the Army, not just in the academic environment. Taken together, these conclusions regarding the key Army directives and studies on leader development have clearly indicated that a gap exists between the Army's learning needs outlined above and current self-development or individual learning approaches and capabilities (U.S. Army, 2002; U.S. Army, 2011; U.S. Army, 2013).

Applicable Theory

The applicable existing educational theory and the one this research is intended to apply is that of connectivism. Barely more than a decade old, connectivism is an emerging learning theory and product of the digital age, which employs four learning principles: autonomy, connectedness, diversity, and openness (Tschofen & Mackness, 2012). The lead theoretician for connectivism, Seimens (2011) suggested that connectivism is networked learning. That is, individuals learn through the development and employment of learning networks that consist of nodes and connections. Individuals serve both as learners and as nodes in the learning networks of others. In connectivism, learning is improved not only by the quantity of nodes and connections, but also by their quality (Seimens, 2011). Boitschwarelo (2010) has suggested that further research into connectivisim is required and that such research should be context-based using local communities. Connectivism theory supports both formal and informal learning (Cowan, Neil & Winter, 2013). Such an approach fits well with this research applying connectivism and PLNs to U.S. Army organizations. Connectivism is not yet widely accepted as an educational theory (Bell, 2011).

Later in the dissertation, I will address related theories including heutagogy (Blaschke, 2012), social constructivism (Pountney, Parr and Whittaker, 2002), and andragogy (Kenyon and Hase, 2001). These three theories, as precursors to connectivism, enable a more complete understanding of the problem a lack of a learning environment presents for the self-development of Army leaders. Heutagogy, social constructivism, and andragogy, with their emphasis on the individual learner rather than the institution,

provide related and complimentary analytic lenses during the analysis and interpretation of data.

A significant and meaningful gap in the current literature on Army leader self-development is the lack research into the application of PLN or connectivism in military organizations. The existing literature addresses the use of PLNs and connectivism in the civilian sector (Rajagopal, Brinke, Van Bruggen, & Sloep, 2012; Sie, et al. 2013; Siemens, 2004; Trnova & Trna, 2012). The military education and leader development systems often overlap with those of civilian institutions, but there are significant differences (Turner, 2014). For example, in the civilian sector, institutional learning, applied learning in organizations such as businesses, and individual self-development are three distinct endeavors rarely linked together deliberately (Gatta, M., 2008; Jacobs, R., 2014). Another example is if a student goes to business school and then joins a corporation. In their spare time they read, blog, or join an informal community of practice to improve themselves. The business is almost never linked to the university the individual attended, nor is either of those linked to the individual's community of practice. In contrast, in the Army, both by doctrine (Army Leader Development Strategy, 2013) and practice, there is a formal and strong connection between the educational institutions and the organizations.

Purpose of the Study

This study employs a qualitative case study research paradigm in order to explore the application of innovations in civilian education to the self-development of leaders in the U.S. Army. The specific innovations being explored are the use of PLN and the

connectivism theory of learning. The phenomenon examined in this case study is that of a group of U.S. Army leaders within an Army unit developing PLNs and then employing those PLNs using a connectivist approach for their self-development. Therefore, the purpose of this study was to examine the usefulness of PLNs (Richardson & Mancabelli, 2009) with a connectivist approach (Seimens, 2004) for establishing and employing learning environments for individual self-development in Army organizations. My intent is to derive themes and best practices for the implementation of effective PLNs to address the problem outlined above.

Research Questions

The following research questions served as a basis for collection and analysis in the qualitative case study. These questions were designed to result in findings and recommendations that will analyze the application of PLNs using connectivist approaches to improving individual Army leader self-development:

- What are the implications of adopting PLNs as the self-development learning environment in the Army?
- In what ways does a connectivist approach improve self-development in Army units?
- How can the use of PLNs and connectivism contribute to the self-development of critical and creative thinking skills, meta-cognition, and problem-solving skills?

Conceptual Framework

The focus of this dissertation is on how military leaders can employ PLNs and connectivism in support of their learning for self-development. Connectivism recognizes

the roles of both the individual and the network in learning (Seimens, 2004; Tschofen & Mackness, 2012; Dunaway, 2011). As an emerging theory, connectivism accounts for collaborative learning in the Digital Age employing Web 2.0 technologies. Connectivism, and in turn PLNs, are enabled by Web 2.0 technologies that create a global digital learning environment. Web 2.0 technologies shape the way people learn due to the broad capabilities that enable the four connectivist tasks of connecting, curating, creating and sharing. In many cases PLNs combine to form communities of practice (Gibson, 2012).

The connectivist and PLN approach recognizes that individuals do not learn in isolation. Individuals learn in collaboration with others as members of one or more communities of practice (Wenger, McDermott & Snyder, 2002). Leaders in U.S. Army units are already in at least one community of practice, the unit itself. Each individual leader is also a member of other communities of practice that include their profession, hobbies, social activities, or other personal or professional interests.

Leadership surveys and feedback from Army leaders suggested that a learning environment for self-development is required (Riley et al, 2011). PLNs (Richardson & Mancabelli, 2011) offer an approach to a learning environment for self-development by connecting individuals to the network and to other learners, subject matter experts, and sources of knowledge. PLNs are being employed in civilian non-military education as such a learning environment.

An enabling component of the conceptual framework is the motivation to engage in self-directed learning. Learning using PLN requires significant motivation on the part of the student, who must ultimately develop and employ their own network. Keller

(2010) describes the role of motivation in learning and more specifically the impact of individual motivation. Self-regulation is the individual's determination to voluntarily engage in, guide and maintain standards in their own in learning, and is necessary for the individual self-discipline to employ PLN for learning. An enabling component of self-regulation is self-efficacy. Self-efficacy reflects the individual's self-confidence that they can in fact develop and employ their PLN in order to learn and perhaps more importantly contribute to the learning of others (Couros, 2009).

The conceptual framework outlined in Figure 1 shows the relationship between PLNs, connectivism and the supporting pillars of Web 2.0 technologies, communities of practice, and motivation. This conceptual framework shaped my research design,

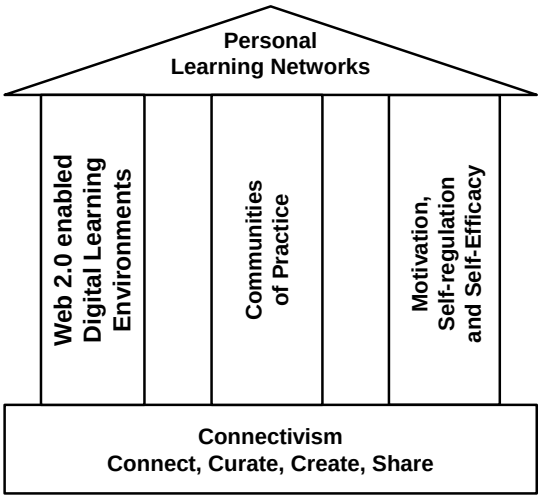

Figure 1. Conceptual Framework

methodology, data collection, and data analysis. The conceptual framework is composed of the five central concepts and the phenomenon of how those concepts combine PLNs in a learning environment for the self-development of leaders in the U.S. Army. The

conceptual framework is relevant to the external to the formal learning environments of the institution, professional military education and the organization, unit leader development.

Nature of the Study

This study was conducted as a qualitative study employing a case study approach. Case studies examine contemporary phenomenon in a real-life context using empirical methods. Case studies use multiple sources of evidence including interviews, the examination of artifacts, focus groups, participant observation, and data retrieval (Yin, 2003). This case study examined a contemporary phenomenon, the use of PLN (Richardson & Mancabelli, 2009) for establishing learning environments for individual self-development in the real-life context of Army organizations. Case studies are particularly applicable to innovation or examining the implications in changes in the environment. Case studies are also applicable when an existing model is examined with a population that is different than existing studies, such as the application of PLN to military education when the majority of existing research is on the use of PLNin primary and secondary civilian education.

Yin (2003) suggested that case studies can be used to explore and describe new and emerging phenomena and their implications. The central phenomenon examined in this study was the use of PLNs by leaders in the U.S. Army to improve self-development and learning. This case study performed that exploratory and descriptive function for PLN and Army leader development.

Types and Sources of Information

In order to examine the applicability of PLNs to the self-development of Army leaders using a connectivist approach, I conducted a qualitative study using the leadership of a unit in the U.S. Army as the sample. Data collection consisted primarily of interviews and focus groups. Two focus groups were conducted, each with eight participants. One focus group consisted solely of lieutenants and one solely of captains. Each focus group consisted of leaders with the same rank, so there was no possibility of undue command or seniority influence in the conduct of the focus group. In this way each respondent felt freer to conduct a forthright and open discussion. Fourteen individual interviews were conducted with captains, majors and lieutenants. The individual interview respondents did not participate in the focus groups or vice versa. The interviews and focus groups were supplemented by participant observation by me as I participated in the ongoing learning using PLNs and connectivism. Data was collected over four weeks of employment of PLNs in order to improve the themes derived from the resulting analysis of the data. A criteria-based sampling strategy was used to choose which Army units will be studied based on the unit not being currently deployed, has executed a planning cycle, and readily available for sampling. Sampling was also purposive in that selecting a unit manned according to the Army-wide processes ensures a fair representation of any like unit any active Army Division. Due to resource constraints and focus of the study, the research sample did not include National Guard or Army Reserve elements. Such samples will have to be addressed in later research.

Analytic Strategies

I employed the LiveScribe system for both analog and digitally-supported analysis of the data. A combination of logical analysis and matrix analysis anchored analysis to determine the general pattern of application of PLN. I used analytic induction to determine why respondents employed PLNs and connectivism as they stated and to discover exceptions to the patterns that emerged. Domain, discourse and narrative analysis was used to refine the identification of opportunities and challenges to adoption of PLN as an Army learning environment for self-development. Qualitative data analysis included the use of LiveScribe, a CAQDA program to generate, among other things, word frequency queries to get a good feel for what leaders state about PLNs.

The coding strategy I used supports a case study approach and is critical to reliable findings. It included open coding, axial coding, and selective coding. Open coding was used to explore ideas found in the literature, interviews, focus group results, and participant observation. Axial coding was used to develop the interconnections among the categories found an open coding. Finally, selective coding was employed whereby the core or fundamental codes determined especially relevant are intensively analyzed through constant comparison of instances that represent the categories or themes to achieve saturation (further investigation yields no new insight into the category). Ultimately, coding reliability depends on how well the codes remain stable, are reproducible, and accurate. Using CAQDA software enables consistently coded information of a like nature using themes and case nodes that do not change over time

individually (stability) or across the sources of data (reproducibility) and are faithful to standardized meaning (accurate).

Definitions

- *PLN*: A learner created, developed, maintained, and adapted network of connections to other learners, educators, sources of information, tools, and artifacts that enable the individual to accomplish their learning objectives (Richardson & Mancabelli, 2011).
- *Connectivism*: A learning theory in which learning is a process that occurs within largely digital environments focused on connecting learners to enable learning. The connections that enable learners to gather and share information are more important than the individuals' current states of knowing (Siemens, 2004).
- *Community of practice*: A network of individuals who connect, share information, and learn together about a certain topic, profession, or discipline. Such communities are informal, semi-structured, and have transient boundaries and processes (Wenger, Mcdermott, & Snyder, 2002).

Assumptions

The key assumption of this study is that formal learning in institutions and organizations are necessary, but not sufficient for the leader to learn all he or she must know in order to be successful in military positions of responsibility. This means that self-development is a necessary component of the overall education and training of leaders that complements formal institutional and organizational learning. The

requirement for self-development then establishes the rational for studying ways in which to improve self-development in Army leaders.

The second assumption critical to this study is that leaders across the Army will have routine access to the internet and learning devices such as computers, laptops, tablets or smartphones in order to create a PLN, employ Web 2.0 technologies and applications, and adopt a connectivist approach to their self-development. If such access and technologies are not available, then the approaches in this study would not be viable and any findings or recommendations could not be implemented.

Scope and Delimitations

The scope of this study is on the self-development of leaders, primarily because while the Army recognizes the importance of leader development in three domains (institution, organization, and self-development), it is the self-development domain that has been least developed and resourced. Since the Army's own studies have indicated a lack of learning environments for self-development, I chose to focus on PLNs.

This study was delimited largely by the sample population in the case that was studied. The sample population was limited to Active Army officers at the tactical levels within an Army combat unit. Due to resource constraints, particularly time to conduct the study, the broader National Guard and Army Reserve populations were not included in the study. For similar reasons, enlisted and non-Commissioned Officers were not included in the sample population for the case study. The case did not include institutional army organizations, such as garrisons or formal educational institutions.

Because all operational Army units are relatively homogenous in terms of demographics, mission and organization, the findings and conclusions in this study should be transferable across the operational Army. Because National Guard and Army Reserve individuals and organizations were not included in the sample case, the findings and conclusions are less transferable to those populations. This case study concerns Army units and military leaders. Accordingly, the findings and conclusions have some, but not complete, transferability to non-Army, non-military learners and educational approaches. I address those specifics in Chapter 5.

Limitations

The design of this project is a case study. Case studies are excellent for the development of themes that enable the observer to draw inferences from what is observed. If implemented, these inferences, in the forms of themes, could enable the Army to make more informed decisions about the application of PLNs and connectivism to leader self-development. However, case studies generally do not support the development of new theories as a grounded theory approach to the research might have, so this study is limited to learning about the application of PLNs and connectivism, not creating a new educational approach. While reliability and validity are addressed in greater detail in Chapter 4, case studies are limited in the sample population and the observable activities, which impacts the transferability and dependability of the observations, findings, and conclusions.

In conducting this research my own experience as an Army officer, my familiarity with training and education in Army units, and my own interest in innovations in

education such as PLNs and connectivism will introduce a certain amount of bias into the effort. The specific educational innovation examined will further be impacted by my tacit theory that motivation and self-regulation would impact the learner's success using PLNs and connectivism. Use of a less-biased subject matter expert to review coding, a deliberate and uniform semi-structured interview protocol for data collection, and the use of nVIVO analytic support software lessons the impact of bias as described in Chapter 3.

Significance

This study significant because it offers the Army insights into how to improve the self-development of its leaders. There is a demonstrated requirement for learning environments that support self-development and an approach that employs PLNs may meet that requirement. Current self-development is limited largely to the provision of lists of recommended books to read or occasional lectures by commanders. A connectivist approach can engage all the learners in a manner in which they learn from each other and are not limited to just interacting with the learners and sources of learning in the Army unit. Even if the findings and conclusions are not implemented by the Army, future Army efforts at leader development and the incorporation of learning systems will be more informed by an in-depth examination of the use of PLNs and connectivism for leader self-development.

Summary

Confronted with the complex challenges of the 21st Century, the U.S. Army recognizes the importance of the educational development of its leaders. However, the Army is hampered in that effort because gaps exist in individual self-development

capabilities as compared to institutional and organizational leader development and education. This study explored the application of PLNs and connectivism and addressed the gap that exists in leader self-development. A qualitative case study methodology wasemployed with the leaders of an active Army unit as the subject population. This study resulted in findings and recommendations that can inform U.S. Army efforts to improve leader self-development, which will in turn enable the Army to secure and defend the Nation and our citizens, potentially with less recourse to combat and with less loss of life and destruction.

Chapter 2: Literature Review

PLNs (PLNs) and connectivism may support the self-development of Army leaders. In support of that potential, I conducted a literature review that focused on the applicable theory and practice of the use of PLNPLNs and connectivism within massive, open, on-line courses (MOOCs), and in the Army. I examined the relevant status of knowledge, 21st Century thinking skills, and learning for self-development, along with the development of connectivism, which I found drew from precursor educational theories of social constructivism and heutagogy. MOOCs, I found, were the primary educational course designs employing connectivism. The impact of Web 2.0 technologies was found to be significant, as those technologies contribute considerably to enabling both connectivism and PLNs. Finally, key learner considerations for effective use of PLNs were examined, including: presence, self-regulation/self-efficacy, motivation, and inquiry-based learning.

Search Strategy

I began the literature review by focusing on leader development in the U.S. Army. This was necessary in order to confirm that the supposed education gap in U.S. Army leader self-development did in fact exist. If such a gap did exist, then I sought to discover what the Army doing to address the gap, and to see if those efforts included PLNPLNs or connectivist approaches. In my search I found that few peer reviewed studies had been conducted on leader development in the U.S. Army. Instead, most resources were found either in military professional journals or published military doctrine.

The literature review search strategy examined relevant theory. Since connectivism and PLNs are relatively new phenomenon within the education discipline, understanding the theoretical basis for both was important to the design of the research effort. Examination of connectivist theory revealed that there is considerable debate on whether connectivism was in fact an educational theory at all. While noted in the literature review, for the purposes of this research effort that topic was not important. What was more important is the application of the principles of connectivism to learning. Examining the precursor theories from which connectivism evolved was also important, as connectivism is not yet fully formed as a theory (Boitschwerelo, 2011) and therefore application of connectivism in MOOCs often revealed that aspects of social constructivism and heutagogy were employed.

The search strategy then shifted to application. The foundation of the use of PLNs was in communities of practice. Application of PLNs was dependent on Web 2.0 technologies and the creation of digital learning environments. The use of PLNs for learning is also dependent on the individual, since this type of learning is in fact "personal." In the literature search I examined the motivation and skills necessary for individuals to successfully employ PLNs. Of these, self-regulation, self-efficacy, and motivation were examined in further detail to identify their impact on individual self-development.

Two major libraries were used for the literature review: Walden University and the Combined Arms Research Library (CARL). CARL is located at Fort Leavenworth, Kansas, the center of leader development and education for the U.S. Army and therefore

a key source for references and existing research. Major search engines employed for this literature review were ProQuest, SOCIndex, and the Air University Library Index to Military Periodicals. Key words employed in the literature search included: *leader development, self-development, PLN, personal learning environment, community of practice, connectivism, social constructivism, heutagogy, andragogy, Web 2.0, distance learning, distance education, eLearning, self-regulation, self-efficacy, motivation*, and *learning*. Various combinations of these key words were used in searches linked by the Boolean terms "and" and "or."

Challenges to this Literature Review

There were two main challenges to the review of literature on self-development of military leaders and the theory of connectivism. Most military journals are not peer reviewed, but instead are fora for sharing ideas and experiences. Rarely are articles in the key military journals such as *Military Review, Parameters,* or *Army Magazine* supported by evidence-based research. Thus, a few key references were included from these journals that were not peer reviewed or evidence-based. The second challenge was that, while my main effort was to employ published, peer review work or published manuscripts, because connectivism and PLNs are "children of the web," many of the leaders of these two educational movements primarily share their ideas and understandings through blogs and web-based sources. Thus, I also examined within these within the overall literature review.

Army Leader Development

U.S. Army doctrine for leader development is extensive. Army Leader development is conducted in three domains: institutional, consisting of Army resident and non-resident schools and courses; organizational, consisting of the training and experiences leaders gain in Army units; and self-development, consisting of individual learning efforts aimed at addressing the individual's learning needs that are not addressed through the other two domains (U.S. Army, 2011). The Army's institutional, organizational, and self-development learning domains are different from and not intended to relate to the Bloom's taxonomy learning domains of psycho-motor, cognitive and affective (Bloom, 2011).

By Army doctrine, the self-development domain consists of (a) formally structured self-development in the institution or organization, (b) guided self-development in which leaders set broad objectives and select topics, and (c) personal self-development in which the individual learns what he or she believes must be learned to be more effective throughout their career (U.S. Army, 2013). Leaders have a responsibility to establish a learning environment for subordinate self-development (U.S. Army, 2013), but 35% of Army leaders surveyed in the annual Center for Army Leadership Survey of Army Leadership (CASAL) reported that their organizational environment was not conducive to learning (Riley, et al., 2012).

The Army fully recognizes the need to improve learning. *The Army Learning Concept for 2015* stated, "the U.S. Army's competitive advantage directly relates to its capacity to learn faster and adapt more quickly than its adversaries" (U.S. Army, 2011).

Unfortunately, the 2011 Center for Army Leadership Survey of Army Leaders revealed that trends over the last five years showed a deficiency in leader self-development, noting that, "two-thirds of Army leaders (66%) indicate leaders in their unit or organization develop the leadership skills of their subordinates to a 'slight' or 'moderate' extent, while only one-fourth (25%) report this occurs to a 'great' or 'very great' extent" (Riley, et al., 62).

Similarly, the recent Army Training and Leader Development Survey found that "junior officers are not receiving adequate leader development experiences, and officers are concerned that the officer education system (OES) does not provide them the skills for success in full spectrum operations" (U.S. Army, 2002). Further, *The Army Learning Concept for 2015* described the need to transform the Army's Learning Model (U.S. Army, 2011). It acknowledges the changing environment and the need to ensure we meet the learning needs of individual Soldiers and leaders at echelons throughout the Army, not just in the academic environment. Taken together these conclusions of the key Army directives and studies on leader development clearly show that a gap exists between the Army's learning needs outlined above and current self-development, or individual learning approaches and capabilities.

The Army Leader Development Strategy has noted that while leader development is fundamental to the Army, such leader development is currently "out of balance" given the emphasis that was placed on warfighting during the more than 12 years of war in Iraq and Afghanistan from 2001 through 2014. The strategy has further noted that leader development must be rebalanced across the three domains (U.S. Army. 2013). The

impact of the two wars in Iraq and Afghanistan also resulted in institutional professional military education being almost exclusively focused on tactical counter-insurgency, with a recent assessment of the Army profession noting the need to broaden leader development and prepare individuals for future, more senior responsibilities (Allen, 2011). Leader development is a shared responsibility between the individual, the organization, and the institution. The Army Leader Development Strategy requires that leaders at all levels create conditions that maximize the development of subordinate leaders (U.S. Army, 2013). Each individual has a responsibility to learn, grow, and develop within the Army profession (FORSCOM, 2013)—a responsibility fundamentally relateed to the concept of self-regulation in learning. Commanders of Army organizations have a responsibility to build tailored programs to meet the distinct needs of the learners in their organizations (FORSCOM, 2013).

Army leader development requirements thus include the need to create environments for effective learning, which relates to the personal learning environments component of the theoretical framework of my research. Army doctrine also requires that the motivation of individuals to learn is improved, which relates to the self-regulation and self-efficacy component of my theoretical framework. The third component of this framework, that of using Web 2.0 technologies, addresses the requirement to, "leverage technology to establish a learning system that provides engaging, relevant, and rigorous resident, distributed, and mobile learning" and "extending learning beyond the schoolhouse in a career long continuum of learning through the significantly expanded use of network technologies" (U.S. Army, 2011, p. 12). The fourth component,

communities of practice, addresses the requirement for leaders to learn through peer-based, social networks (U.S. Army, 2011). The last component of the theoretical framework is that of connectivism, about which the senior general of the U.S. Army stated, "connecting ideas is important, connecting the right ideas is even more important" (Dempsey, 2011, p. 25). Thus, the review of existing literature on U.S. Army leader development shows that a gap does in fact exist in the self-development domain of leader development and that within that gap all five components of the theoretical framework for this research are present.

Knowledge and Learning

The objective of self-development is improved skills, attributes and the acquisition of knowledge. Knowledge is both a commodity and a social activity (Bell, 2011). Kop (2011) described two approaches to knowledge: one focused on acquisition and the other on participation. In the anticipation approach connections are made with resources, and behaviorism and cognitivism reign. In the participation approach connections are made with people, and social constructivism, action theory, communities of practice and connectivism are the key theories. Connectivism draws on Snowden's four ontologies of knowledge: simple, complicated, complex and chaotic (Snowden, 2005; Bell, 2010). Davis, Edmunds and Kelly-Bateman (2013) suggested that the half-life of knowledge, the time it takes knowledge once introduced to become obsolete, is steadily decreasing due to technological connectivity. This last is an important consideration for Army officers as their PLN and resulting learning must account for the short half-life of knowledge.

The concept of rhizomatic learning takes the idea of knowledge as a social activity one step further, suggesting that the increasingly transitory nature of current or accurate information causes knowledge to be negotiated across communities (Cormier, 2008). In the rhizomatic approach the community is the curriculum, and learning advances not along a set path, but rather where the environment is conducive for learning, in much the same way a rhizome such as crabgrass grows not in a set pattern, but where the ground is fertile. Thus, in the rhizomatic approach the community of practice is an environment in which knowledge creation is both social and personal. An example of knowledge creation as negotiation in military units is the development of standard operating procedures (SOP) in which many service members learn and provide input until consensus is reached on what the organization knows about a certain procedure, process or tactic. Army leader development must then account for aspects of rhizomatic learning.

Kop (2011) states that in order to employ personal learning environments learners need creativity and innovative thinking, as well as critical analysis skills and flexibility to adapt to new situations. Perhaps most important is the necessity to "learn to learn," a key objective of connectivism (Downes, 2005). Learning to learn is a key objective of Army leader self-development, as they must be able to learn in and about a variety of complex and emerging situations. Kenyon and Hase (2001) suggest in their explanation of heutagogy as a self-directed learning approach, the importance of learning to learn. Barnes, Marateo, and Ferris (2007) noted that the critical thinking skills of Net Generation learners are weak and must be improved through educational approaches that account for how that generation learns. Given the criticality of "learning to learn" to the

employment of PLN and connectivism for leader self-development, it is necessary to understand the learning theory underpinning self-development.

Learning Theories for Self-Development

Connectivism is just emerging as a learning theory and as such it is important not just to understand connectivism as a learning theory, but also the more established learning theories from which connectivism is drawn. The three major traditional learning theories are behaviorism, cognitivism and constructivism. From these three major theories there are significant branch theories, among which the most important to this research are social constructivism and heutagogy. Learning theories are the working philosophies of education that instructors develop as a preliminary foundation to their practice of teaching (Ciccerelli, 2007; Wade, 2012). Learning theories must account for whether learning is considered a process or a product (Bell, 2011). Behaviorism governs the teacher's manipulation of the learning environment of the student (Bell. 2011). As such behaviorism is less relevant to self-development that is disconnected from an institutional environment. Cognitivism focuses on learning as it takes place within the mind, or brain, suggesting the learner is an information processor (Bell, 2011). These three traditional theories of learning are supplemented by newer and emerging theories that also contribute to the basis for connectivism.

Heutagogy, rhizomatic learning, and quantum perspective of learning are other learning theories that relate to networked theories of learning, including: (Wayne, 2013; Keskin & Metcalf, 2011). These learning theories reflect Kop and Hill (2008) observation that global networks and emerging technologies are encouraging learners to develop new,

creative and different forms of communication and knowledge creation outside formal education. Navigationism, suggested by Brown (2005) as follow-on to social constructivism and connectivism, argues learning is the activity of exploring, evaluating, manipulating, integrating and navigating contexts and environments to solve problems.

Churches (2009) adapted Bloom's Revised Taxonomy and offers Bloom's Digital Taxonomy. Emerging learning taxonomies must account for the impact of digital collaboration facilitated by Web 2.0 technologies in the classroom (Sims, 2008; Churches, 2009). Churches' verbs for the creativity highest level of learning includes mixing, remixing, blogging, wiki-ing and constructing; all verbs that are associated with the connectivist learning activities. For the purposes of this dissertation Bloom's Revised taxonomy was employed throughout the study design, data collection, analysis, and conclusions.

Social Constructivism

Social constructivism may be considered the bridge theory between behaviorism and cognitivism as early theories and connectivism as the emerging theory (Anderson & Dron, 2011). Anderson and Dron (2011) stated that over time social constructivist approaches to distributed, distance education began to resemble institution-based learning in being teacher-centric and focused on passive content delivery, resulting in innovative educator's search for more relevant approaches such as connectivism. In cognitivism and behaviorism, the locus of control is the teacher or instructional designer, whereas social constructivism is student-centric. Social constructivism also moved in the direction of

connectivism by stressing the importance of learning to learn over the content orientations of behaviorism and cognitivism (Anderson & Dron, 2011; Wade, 2012).

Several key themes recur across many of the models of social constructivism. Among these is new knowledge as building on the foundation of previous learning. Another theme is that learning is an active rather than passive process. A third theme is metacognition and evaluation as critical to learner's ability to self-assess learning. And social constructivism recognizes the importance of the learning environment as learner-centric, yet possessing multiple perspectives (Anderson & Dron, 2011). Other key features of constructivism include: knowledge and truth are created, not discovered by the mind; centrality of meaning; reality is socially constructed; rejection of world-centered traditions of knowledge; social construction of knowledge; centrality of language; and contextualization of knowledge (Jha, 2012). Social constructivists believe that the individual must have a say in their own learning and that learners must move from being fed content in specific disciplines to a focus on knowledge making, with an orientation on relational learning vice set curricula (Jha, 2012).

Social constructivism emphasizes collaboration and social interaction between learners (Powell & Kalian, 2009; Ravenscroft, 2011), in a manner very similar to connectivism. This includes accounting for Vygotsky's Zone of Proximal Development, in which learning occurs when the learner is assisted by another. Related to the zone of proximal development is the concept of scaffolding, in which learners are assisted by peers, teachers or others to achieve the next level of understanding (Powell & Kalina,

2009; Marshall & Horton, 2010). Games also contribute to collaborative learning in a constructivist model (Miller, Shell, Khandaker, & Soh, 2011).

Heutagogy

Heutagogy, the study of self-determined learning, is to a certain extent a bridge between traditional educational methodologies and connectivism that provides a different approach to learning from traditional behaviorist, cognitivist and constructivist approaches (Kenyon & Hase, 2001). Unlike connectivism, which seeks to be a comprehensive approach to informal and formal learning in institutional, blended, distance, on-line and self-actuated venues, heutagogy is aimed at improving institutional learning, such as the learner designing his or her own course (Blaschke, 2012; Kenyon & Hase, 2001). Heutagogy is related to and in part derived from andragogy, with its emphasis on adult learning and self-directedness (Kenyon & Hase, 2001). While andragogy emphasizes "getting the students to learn," heutagogy emphasizes "how the student learns" (Blaschke, 2012). In that sense heutagogy is oriented on self-determined and student-centered learning.

Key concepts in heutagogy include double-loop learning and self-reflection. In double-loop learning, the learner not only solves problems, but seeks to understand how their own beliefs and actions are influenced (Blackman, Connelly & Henderson, 2004). To achieve self-reflection learners must demonstrate self-efficacy, creativity and positive values (Blaschke, 2012). The design elements of a heutagogical approach include; learner-defined learning contracts, flexible curriculum, learner-centric questions, and

flexible and negotiated assessments (Blaschke, 2012). With its focus on the individual, heutagogy is a student-centered approach.

Rogers (1969) suggested five key hypotheses for student-centered approaches to learning. The first was that teachers cannot teach another person directly, but rather can only facilitate learning. The second was that people focus learning on what they believe will support their own personal development. The third hypothesis for student-centered learning was that changing one's self in terms of beliefs and understanding is resisted through denial or distortion, and those personal beliefs become more rigid under the threats posed by new learning and confrontation. Rogers fourth hypothesis was that individuals had to expand their understanding and organization of self to overcome perceived inconsistencies with their belief system. His final hypothesis for student-centered learning was that instructional approaches that minimized the threat to the beliefs of the individual were the most effective in terms of learning.

Heutagogy is rooted in complexity and systems theory. It is a learner-centric approach that sees the learner as the major agent in their own learning. As such, heutagogy is also founded in action research theory, which provides flexibility to understand unpredictable and complex phenomenon (Hase & Kenyon, 2007). Modern workplaces are complex systems and action research approaches enable learning and understand in context. Heutagogy is enabled by the ubiquitousness and capabilities afforded by Web 2.0 technologies. It has been called a net-centric theory that takes advantage of the internet for digital age teaching and learning; encouraging interaction, reflection, collaboration and information sharing (Blaschke, 2012).

Connectivism

Siemens (2004) in introducing connectivism as a learning theory for the digital age suggests that theories of behaviorism, cognitivism and constructivism are inadequate to explain the process of learning in an educational environment of rapid, vast and shifting technology. Bell (2011) also notes that theories of learning, such as behaviorism and cognitivism are no longer adequate in a 21st Century, Web 2.0 enabled, distributed and interconnected learning environment, suggesting educational approaches must account for the distribution of learning across networks. Anderson and Dron (2011) also emphasize that behaviorism and cognitivism are less applicable to social networked learning than they are to institutional, face-to-face learning, but state that the behaviorist component of stimuli and the cognitive components of motivation, attitude and bias continue to apply to web-enabled, connected learning.

The connectivist model suggests that learning takes place when learners make connections by extending their PLNs to gather ideas from a variety of sources of information and using information technologies (Dunaway, 2011; Sims, 2008). The connectivism networked approach is not limited to non-human, web-enabled networks, but includes the neural networks of the mind. The neural network is then a network within the overall network (Bell, 2011). The principles of connectivism emphasize the distribution of learning across networks of people and things (Bell, 2011). Tschofen & Mackness (2012) expand upon this idea describing connections that are neural, conceptual and social. Connectivism is also linked to actor-network theory (Bell, 2010; Bell, 2011; Anderson & Dron, 2011). Both connectivism and actor network theory

include human and non-human objects in analysis, as opposed to behaviorism, cognitivism and constructivism which account for only human interactions (Bell, 2010). The connectivist idea that learning occurs when connections are made reinforces Dempsey (2011) the importance for Army leaders of connecting ideas.

Principles of Connectivism

Seimens (2004, p.4) in introducing the theory of connectivism developed a set of principles for the application of connectivism to education and learning. Seimens and Downes incorporated these principles into the design of their MOOC and as a means to teach the connectivist approaches. The connectivist principles are:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Connectivist principles can be used to structure action-research in the classroom, enabling students to learn how to learn better than using traditional methodologies (Trinova & Tran, 2012; Barnett, McPherson & Sanderson, 2013) and reinforces that use of Web 2.0 to learn to learn (Anderson-Inman, 2009). Connectivism assists students in "learning to learn" about technology (Davis et al, 2012). Atwell (2010) stresses students learning how to learn in contexts and ways that are meaningful to them. The connectivist principles can be applied to the employment of connectivism and PLNs for the self-development of Army leaders.

Properties of Connectivism

In developing the connectivist approach to learning Downes (2010) suggested the four properties of connectivism: autonomy, connectedness, diversity and openness. Building on the work of Downs, the quantitative research of Hogg and Lomicky (2012) suggested that educators who want to optimize learning in online class environments should harness those connectivist properties. Additionally, research has suggested that educators who wish to maximize the educational advantages of Web 2.0 technologies and the network should embrace connectivism (Anderson-Inman, 2009).

Connectivist properties of autonomy, connectedness, diversity and openness can be crosswalked to the Big 5 personality traits of openness, conscientiousness, extraversion, agreeableness and neuroticism. The connectivist properties also crosswalks to the self-determination traits of autonomy, relatedness, and competence. Openness in connectivism corresponds to openness in personality theory and relatedness in self-determination theory. Connectedness in connectivism also corresponds to relatedness in

self-determination theory. Autonomy in connectivism corresponds to conscientiousness in personality theory and autonomy in self-determination theory (Tschofen & Mackness, 2012). Autonomy is an expectation of the Net Generation in terms of the structure of their education (Barnes, Matareo, & Ferris, 2007; Skiba & Barton, 2006). Thus, connectivism is strongly linked to self-determination, which contributes to the U.S. Army doctrinal requirement that individuals take responsibility for their own development.

In terms of connectedness, Tschofen and Mackness reinforce Siemens' observation that it is not enough to be connected, one must also contribute. To be a lurker is to be a taker and not one who contributes to the growth of knowledge in the network. Thus, the role of the individual in web enabled environments is not simply to develop their own learning, but also to actively create knowledge that will benefit others (Pountney, Parr, and Whittaker, 2002). Huang, Yang, Huang, and Hsiao (2010) noted that knowledge sharing includes not only conveying knowledge to others, but also helping others to understand and learn the meaning of knowledge. In terms of diversity, connectivism enables a diversity of opinions engaged through a virtual, Web 2.0 technology enabled, learning environment (Davis et al, 2012). This concept of not just learning, but contributing to the learning of others supports the Army Learning Concept for 2015 component of peer-based learning.

Activities of Connectivism

Learners employing connectivist approaches engage in four activities: aggregation, remixing, creating, and feed forward (Downes, 2011). These learners are at the center of the learning experience (Kop and Hill, 2008). Learners who create a blog

post, podcast or concept map and then feed it forward are sharing their sense making with others (Kop, 2012; Ravenscroft, 2011). Aggregation is the collection of meaningful artifacts by learners. In informal MOOCs, such as Connectivism and Connective Knowledge (CCK11), aggregation begins with a feed of a newsletter or suggested readings from an educator acting as facilitator. Remixing is drawing connections between artifacts or materials, basically synthesis in Bloom's taxonomy terms. Repurposing is applying what has been aggregated and remixed into new knowledge for a new purpose. Feeding forward is sharing what has been learned with other learners. Taken together these activities make up connectivist learning methodology (Downes, 2011) and must be integrated into an examination of Army self-development employing connectivist approaches.

Weakness of Connectivism

It has been suggested that connectivism makes its contribution primarily as a phenomenon, rather than as a theory (Wayne, 2013; Bell, 2011). While critics say the theory is lacking in rigor, connectivism seizes the opportunities presented by web technologies (Bell, 2011). A potential strength of connectivism as a learning theory is its potential ability to develop healthy networks to accommodate the psychological diversity of participating learners (Tschofen & Mackness, 2012). A challenge of connectivism as a theory is its inability to explain how concepts are developed (Clara & Barbera, 2013). Trnova and Trna (2012) conducted a case study of connectivism in science education and found that students who applied the principles of connectivism performed better than expected using traditional educational theories. Baggaley (2012) observes that no

research has been done on the opposite of connectivism, “disconnected learning,” which weakens the argument for connectivism. The major proponents of connectivism demonstrate its power for learning in the digital age through application in massive open online courses or MOOC.

Massively Open Online Course (MOOCs)

Massive open online courses are exactly what the name suggests. The term massive refers to literally thousands of people participating in the course at any one time and is drawn from the term massive as it refers to massive online games. The courses are open, in that anyone can enroll. There are no prerequisites, no institution one must belong to in order to enroll, and no constraints on which courses an individual may take. The courses are conducted online, because that is the only solution that enables such courses to exist. And, MOOCs are courses, in that they have learning objectives and a structure to accomplish those learning objectives, even if that structure may not be familiar to those who have spent their lives as teachers or students in brick and mortar, face to face educational settings. There are two types of MOOCs: traditional course offered online and in an open format such as Coursera and edX, usually with a behaviorist pedagogy; and MOOC that are guided by connectivist pedagogy (Clara & Barbera, 2013). MOOCs have served as a testing ground for connectivism (Sangra & Wheeler, 2013; Tschofen & Mackness, 2012). Like the educational theory of connectivism to which they are linked, MOOC are a recent phenomenon, so that existing research in MOOC is limited (Fournier, Kop, & Durand, 2014).

The course structure used for the MOOCs that have shaped connectivist approaches includes: a course wiki on which all course resources were gathered, a daily newsletter to highlight contributions from learners, discussions on blogs, Twitter and a course discussion board, and weekly presentations relevant to the weekly topic (Kop, 2011; Downes, 2011). Fredette (2013) observes that in order to produce these complex combinations of content and technologies, MOOC faculty are often supported by sizable teams and due to the large, distributed learner population in a MOOC, a traditional MOOC student doesn't exist. An advantage of MOOC is that due to the sizable population and technologies large volumes of data are available for analysis. A second advantage is the students' developing connections and networks for continued learning (Saadatmand and Kumpulainen, 2014). A disadvantage of MOOC is that they may be unintentionally formalizing informal learning (Sangra & Wheeler, 2013).

Kop (2012) notes that MOOCs are distributed in the cloud in which Open Education Resources (OER) are produced, researched and shared by participants worldwide. Cloud computing provides MOOCs with access to services, storage and resources on demand with relatively little burden on the learner. Cloud services enable sharing, networking and communication necessary to successful MOOC and connected learning. Cloud applications promote creativity by learners, both individually and collectively through the generation of ideas by combining bundles of knowledge in new ways; reinforcing the four connectivist activities of aggregation, remixing, creating and feed forward (Kop, 2012). While Army self-development employing PLN will not be the

same as a MOOC, the connectivist activities are relevant to learning employing PLN with a connectivist approach.

Impact of Web 2.0 Technologies

Dunaway (2011) suggests that in the digital age learning landscapes are networked, social and technological and these learning landscapes are enabled by Web 2.0. People have become the producers of information (Bell, 2013). Web-enabled learning is conducted with individuals as independent, informed, and capable learners in either formal or informal settings (Bell, 2011). Technologies provide the interaction necessary for connectivist approaches in on-line courses (Hogg & Lomicky, 2012; Tinmaz, 2012; Ravenscroft, 2011). Web 2.0 tools have created a "global information space" that is affecting how people learn and is having a transformational social impact. Web 2.0 technologies promote the creation of knowledge by providing digital artifacts that are: modifiable, enhanceable, programmable, linkable, searchable, collapsible and collaborative (Anderson-Inman, 2009). Mobile Web 2.0 technologies support connectivism by enabling scaffolding in learning (Ozan, 2013), so that learning is portable in ways never possible before. Learners can access information more efficiently through an increasing number of Web 2.0 technologies (Campbell, 2012).

Web 2.0 technologies require the development by learners and teacher/facilitators of digital literacy skills, including: play, performance, simulation, appropriation, multitasking, distributed cognition, collective intelligence, judgment, transmedia navigation, networking and negotiation (Anderson-Inman, 2009). Among these skills are metaliteracy as a self-referential framework that integrates emerging technologies and

transliteracy as the ability to read, write and interact across a range of platforms, tools and media (Dunaway, 2011). Net Generation learners, those generally under 30 years of age, have grown up with Web 2.0 and easily employ blogs, wikis and apps in support of learning and sharing knowledge (Barnes, Matareo & Ferris, 2007; Skiba and Barton, 2006). The learner-centric opportunities afforded by Web 2.0 technologies enable emerging educational approaches such as heutagogy to employ self-directedness and learner-generated content (Blaschke, 2012).

Personal Learning Environments

Nearly everyone has some form of personal learning environments and PLNs (Loertscher, 2011). Digital, Web 2.0 technologies enable individuals to personalize their learning environment, connect, creating and manage a learning network to meet their own learning needs. These combinations of personal networks and tools are called Personal Learning Environments (Tu, Sujo-Montes, Yen, Chan, and Blocher, 2012; Wilson, 2008) or in practice PLN. Downes (2010) suggests PLNs are atmospheres that contain tools that allow engagement for learning in a distributed environment of people, services and resources. This is supported by the approach that learning requires a context that includes real world attributes (Westera, 2011). Participation in MOOC enabled learners to extend their PLN through access to other learners, blogs and twitter sources of information (Kop, 2011). Constructionists assert that knowledge is not only created in the learner's world, but through co-creation through interactions with other learners (Jha, 2012). Pountney, Parr, and Whittaker (2002) suggest a variation of social constructivism they term communal constructivism. In doing so they describe network enabled situated learning

environments that have many of the characteristics of a PLN, including: "authentic contexts, authentic activities, access to real life expert performances, multiple roles and perspectives, collaborative construction of knowledge, reflection to enable abstractions to be formed, coaching and scaffolding at critical times, and authentic assessment."

Each learner can organize their PLN to meet specific requirements to assist in achieving formal and informal learning goals (Campbell, 2012). Net Generation learners in particular seek connections to others in support of learning (Barnes, Matareo & Ferris, 2007; Skiba & Barton, 2006).). An individual's PLN changes throughout their career as their learning needs change (Rajagopal, Brinke, Van Bruggen & Sloep, 2012). Wilson (2008) found that PLN consists of constructed patterns of personal learning tools and learning networks. Some offer that in structuring their PLN, learners learn mainly from peers, work and research partners, friends, and external colleagues. In the design of the study for this dissertation, Army leaders as learners must structure their own PLN.

PLN contribute to learning in a variety of ways. Thornburg (2004) uses metaphor to describe the learning venues of the virtual world, including: "campfire" signaling the role of the teacher as sage; "watering hole" signaling the role of peer-learning in the PLN; and "cave" signaling the ability of the individual to engage in personal learning and reflection via their PLN. Tobin, D. (1998) suggests that PLNs can help the learner to: sift through data, identify learning resources and opportunities, and sharing wisdom through dialogue. Dunaway (2011) suggests learners form their own information networks including learning communities so that they can both create and consume knowledge.

Learners construct a PLN through building connections, including adding people and activating connections with selected persons for the purposes of learning. Factors that affect the considerations for forming of connections to others include: communality, organization of the contact, network of the contact, reputation, benevolence, like-mindedness, real potential for collaboration and real potential for learning (Rajagopal, Brinke, Van Bruggen & Sloep, 2012). Learners adapt their PLN through reflective practice (Davis et al, 2012). Students can include games when constructing their PLN; particularly since research suggests games are meaningful, relevant, iterative, and portable; all characteristics desirable in a PLN (Barab, Gresalfi & Arici, 2009).

PLNs also enable the learner to place learning in a relevant context with real world attributes. Enabled by digital Web 2.0 technologies PLN provide the dimensions of context necessary for learning in a virtual world (Westera, 2011). By connecting to more real world situations PLN for self-development provide the context that educational institutions, including the institutions of the U.S. Army, lack. Westera (2011) suggests that a learner's context consists of several compartments: domain knowledge, pedagogy, operational setting, virtual space, and human culture. Within those compartments learning entities include: individuals, objects, processes, and ideas. For the learner, an individual PLN primarily provides the virtual space compartment of context, linked to the other compartments and employing the four entities. Another approach to context is that of Frohberg, Goth and Schwabe (2009) which is to view the context of mobile learning in terms of: independent, formalizing, physical and socializing. Since the use of PLN is mobile in nature, this model for context is also appropriate. Each MOOC forms, even if

only for a short time a community of practice among those who are connected and motivated to learn more about a particular subject.

Communities of Practice

A major factor in the success of a networked learning environment is a genuine community of practice (Kop, 2011). Communities of practice are "groups of people who share a common set of problems or interest in a topic and who grow their knowledge and expertise in the area by interacting on an ongoing basis" (Wenger, McDermott, and Snyder, 2002, p. 4). In this study, the leadership of an Army unit is potentially such a community of practice. They share the concern and problems of potential military operations and wars and as volunteers to serve in the military are clearly passionate about their profession. Through working together these Army leaders have the potential to expand their knowledge and improve their expertise. Wenger, McDermott, and Snyder (2002) further suggest that over time communities of practice develop a unique perspective on a body of common knowledge, practices and approaches. Such a common approach to military operations is necessary if the leaders of an Army unit are to work together to be successful in military operations.

Building on the community of practice approach to learning, Cormier (2008) suggests that because knowledge is socially constructed and acquired through negotiation across communities, the community becomes the curriculum. This informs connectivist theory as the structure of the networked community emerges based on the learning objectives of the individual or the community of practice. Learners engage in learning through networks because they desire a community in which to share common interests

or practices, exchange ideas or receive support (Sie et al., 2013; Singh, 2011; Wenger, 1997). Established communities of practice operate to legitimate and disseminate constructions or offer formal resistance to dominant constructions (Jha, 2012). Community members often dedicate significant time to sharing insights and resources regarding what works and what needs improving in the employment of PLN (Campbell, 2012). Huang, Yang, Huang & Hsiao, 2010) suggest mobile applications can be employed to form virtual communities of practice and that knowledge sharing groups are actually communities of practice. Communities of practice, MOOC, PLN, and connectivism all require action on the part of learners to get from theory of learning to reality of knowing. Several factors affect the degree to which Army leaders will act within the framework of this research.

Key Factors in Learner Activity

There are many factors that affect the degree and effectiveness of learner activity when employing PLN and connectivism for leader self-development. A recent study (Garcia, Tenorio & Ramirez, 2015) found that less than of more than 17,000 persons enrolling in a MOOC, less than 5% participated regularly, completed the course and received credit. Review of existing literature suggests that among these are the physical or virtual presence of others, including teachers and peers in the community of practice. Self-regulation and self-efficacy are two additional factors that affect the degree to which learners will participate in MOOC or employ their PLN for self-development. Motivation completes the set of key factors for success in employing PLN and connectivism for Army leader self-development.

Presence

Presence is critical to learning. Kop (2011) describes three types of presence: cognitive, social and teacher, suggesting the higher the level of presence, the more the depth of learning is improved. Cognitive presence is the means through which learners construct and confirm new knowledge. Cognitive presence in constructivism exploits role modeling, imitation and dialogic inquiry (Anderson & Dron, 2011).

Social presence is the proximity, physical or virtual, to other learners, teachers, facilitators, mentors, and others. Social presence has yet to be shown as making a difference in learning outcomes (Anderson & Dron, 2011; Mackey & Freyberg, 2010). Social presence in social constructivism is captured in Moore's concept of transactional distance (Anderson & Dron, 2011). Social ties within a social network enable presence in support of learning (Huang, Yang, Huang, & Hsiao, 2010; Mackey & Freyberg, 2010; Singh, 2011). Net Generation learners employ their social networking skills to create online communities to connect to other learners and fulfill their own learning objectives (Barnes, Matareo, & Ferris, 2007; Skiba and Barton, 2006; Berge, 2008). Teachers, while having their own presence in the learning dynamic, contribute also to social presence (Berge, 2008).

Teacher presence in social constructivism envisions the teacher as a guide, helper, and partner as opposed to a content deliverer (Berge, 2008; Anderson & Dron, 2011). Hogg and Lomicky (2012) suggest that group collaboration in online learning increases student engagement due to a sense of community. Since the advent of online learning via the web students' expectations of teacher's presence have grown over former non-web

enabled distance learning (Berge, 2008). Those expectations include the ability to connect virtually not only with other learners, but also with teachers. Teacher presence is also captured in the concept of teacher immediacy, which is the communication behaviors that enhance physical and psychological closeness with one another (Frymier, 1993).

Self-regulation and Self-efficacy

Since the use of personal learning environments and networks is inherently an individual activity, self-regulation, as the deliberate control of one's thoughts and actions (Fox & Risconcscente, 2008) is critical to the outcome of learning employing PLN. There is a connection between the learner as "self," the medium and the content that is affected by self-regulation (Fox & Risconscente, 2008). In terms of self-regulation Tschofen and Mackness (2012) note that behaviorism and cognitivism as traditional learning environments rarely allow "expression of self," but rather on expressions and degree of control by learners desired by instructors. Effective participation in connectivist MOOC learner's self-direction was determined by: motivation, initiative, confidence, control, time management, and goal setting (Kop, 2011; Garcia, Tenorio & Ramirez, 2015). An important aspect of PLN is learner autonomy (Campbell, 2012). Gerstein (2013) and Balasubramanian et al (2010) suggested that self-direction can significantly improve teacher self-development, particularly if coupled with: inquiry based ideas, context-specific programs, and collaborative decision making.

In connectivist approaches, learners often yearn for a more controlled environment. A common complaint in the beginning of MOOCs is that students feel lost.

This requires significant effort on the part of facilitators in MOOCs (Anderson & Dron, 2011). Tschofen and Mackness (2012) noted that participation in MOOC may place learners in unfamiliar choice and control situations in relation to their autonomy. Such choice and control situations are resolved through the learner's intent, habit and will as suggested by James and Paiget, cited by Fox and Risconscente (2008). Kop (2011) found that some learners in MOOC preferred self-direction, while others preferred more coordination and directed assignments. Researchers found that Net Generation learners need self-direction to be a component of their learning structure (Barnes, Matareo & Ferris, 2007: Skiba & Barton, 2006).

Related to self-regulation is self-efficacy. Self-efficacy is the individual learner's confidence that they can perform the task, in this case self-directed learning. Factors that affect self-efficacy include: experience, vicarious experience of others, social persuasions, and physiological factors (Couros, 2009). Brennan (2013) citeed Bandura in noting that self-efficacy is encouraged by four factors: physical and psychological responses, encouragement and persuasion, vicarious experience, and mastery experiences. Self-efficacy can also be improved through intrinsic motivation (Lei, 2008). Self-efficacy doesn't happen in a vacuum; educators help shape environments that promote self-efficacy in learners; this is missing in MOOC (Brennan, 2013). Self-efficacy can be improved through the use of Web 2.0-base support tools that enable the student to navigate the web and curate information more easily and effectively (Bolman et al, 2007).

Motivation

Also related to self-regulation is motivation. Hartnett, St. George and Dron (2011) suggested that motivation is promoted by self-determination, itself a component of self-regulation and self-efficacy. Learning is increased when the student is motivated intrinsically and extrinsically, including by tangible recognition (Lei, 2008; Deci, Vallerand, Pelletier & Ryan, 1991). For Army leaders this is an important consideration, since promotion, key positions and efficiency reports are all readily visible examples of tangible recognition. Motivation is also increased by learning about an interesting task (Lei, 2008; Hartnett, St. George & Dron, 2011). For that reason, Army leader self-development should either have the learner-centric tasks to be learned which are selected by the individual, or selected by the senior leader, but focused on tasks that are clearly important to the community of practice. Metacognition also contributes to motivation. Paiget, cited in Fox and Risconscente (2008), described metacognition as knowledge of one's own thoughts and thought processes. If a learner is going to employ PLN, then such metacognition will be critical to effective learning. Fox and Risconscente (2008) suggested that metacognition is a requirement for reflective thinking and learning.

Inquiry-based Learning

Self-development employing a PLN requires that the learner take an inquiry-based approach, developing on their own the questions that they believe they must answer in order to learn what they desire to know and do. Learners must assess critical issues and determine what is of interest and relevant to them as they employ inquiry-based learning (Kenyon & Hase, 2001; Thornberg, 2004; Justice et al, 2009). Reinforcing that suggestion is the emphasis on the importance of teachers coaching and facilitating

learner-directed questions (Berge, 2008; Blaschke, 2012). Inquiry-based learning is focused on understanding, not merely knowledge acquisition, which raises the level of student reflection and thinking (Thornberg, 2004: Marshall and Horton, 2010). Within a community of practice learners asking each other questions enables both social constructivism and connectivism pedagogies (Justice et al, 2009).

Summary of Literature Review

The literature review revealed that the emergent nature of PLN, connectivism, MOOC, and Web 2.0 technologies is balanced by established components of the educational discipline. Theories of social constructivism and heutagogy provide a solid basis for connectivism. Communities of practice provide a context for the emergence of PLNs and MOOCs. Learner action is critical to success with PLNs and MOOCs, and that requires motivation, self-regulation, self-efficacy, and virtual presence. The literature review also confirmed the existence of the suspected gap in the self-development domain of U.S. Army leader development doctrine. Finally, the theoretical framework developed for this research project was supported by the results of the literature review as an approach to addressing the self-development gap by employing PLN and connectivism.

Chapter 3: Methodology

The purpose of this study was to examine the use of PLNs (Richardson & Mancabelli, 2009) for establishing learning environments for individual self-development in Army organizations. My intent was to derive themes and best practices for the implementation of effective PLNs in support of self-development.. In order to accomplish this purpose, I used a qualitative study employing a case study approach. The central phenomenon I examined was the employment of PLNs using a connectivism methodology by leaders in the U.S. Army to improve self-development and learning. This chapter describes the methodology employed in this study and includes: the research design, methodology, and issues of trustworthiness.

Research Design and Rationale

Research Questions

The following research questions served as a basis for collection and analysis in the qualitative case study. These questions were designed to result in findings and recommendations that will analyze the application of PLN using connectivist approaches to improving individual Army leader self-development (Greer, 2013):

- What are the implications of adopting PLN as the self-development learning environment in the Army?
- In what ways does a connectivist approach improve self-development in Army units?

- How can the use of PLNs and connectivism contribute to the development of critical and creative thinking skills, meta-cognition, and problem-solving skills?

Central Concepts and Phenomenon of the Study

The focus of this dissertation is on how military leaders can employ PLNs and connectivism in support of their learning for self-development. Connectivism recognizes the role of both the individual and the network in learning (Seimens, 2004; Tschofen & Mackness, 2012; Dunaway, 2011). As an emerging theory, connectivism accounts for collaborative learning in the Digital Age employing Web 2.0 technologies. Connectivism, and in turn PLNs, are enabled by Web 2.0 technologies that create a global digital learning environment. Web 2.0 technologies shape the way people learn due to the broad capabilities that enable the four connectivist tasks of connecting, curating, creating and sharing (Siemens, 2004).

The individual learner's PLN enables learning in connection with others. By engaging in a connectivist approach to learning in collaboration with others, each learner becomes a member of one or more communities of practice. Wenger, McDermott and Snyder define communities of practice as "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (2002, p. 4). Leaders in U.S. Army units are already in at least one community of practice, the unit itself. Each unit contains all of the characteristics in Wenger, McDermott and Snyder's definition of a community of practice. Leaders in U.S. Army units are groups of people who share the concern of defending the Nation, share problems of future warfare, have a passion for their

profession, and are driven to deepen their knowledge and expertise. Each individual leader is also a member of other communities of practice that are joined, consciously or not, as a result of an individual desire to learn or experience more about their profession, hobbies, social activities, or other personal or professional interests.

Leadership surveys and feedback from Army leaders suggests that a learning environment for self-development is required (Riley et al, 2011). PLNs offer an approach to a learning environment for self-development by connecting individuals to the network and to other learners, subject matter experts, and sources of knowledge (Richardson & Mancabelli, 2011). PLNs are being employed in civilian, non-military, education as such a learning environment.

Learning using a PLN requires significant motivation on the part of the student, who must ultimately develop and employ their own network. Keller (2010) describes the role of motivation in learning and more specifically the impact of individual motivation. Self-regulation is the individual's determination to voluntarily engage in, guide, and maintain standards in their own in learning. Self-regulation is necessary for the individual to employ a PLN for learning. An enabling component of self-regulation is self-efficacy. Self-efficacy reflects the individual's self-confidence that they can in fact develop and employ their PLN in order to learn and, perhaps more importantly, contribute to the learning of others (Couros, 2011).

The conceptual framework outlined in Figure 1, introduced in Chapter 1 and reproduced for reference here, captures the relationship between PLNs, connectivism and the supporting pillars of Web 2.0 technologies, communities of practice, and motivation.

This conceptual framework guided the research design and methodology throughout the life cycle of this study. The major components of the conceptual framework served as the initial keywords for, and guided the search strategy of my literature review. The conceptual framework drives data collection to structure interview and focus group protocols that I designed to explore the phenomenon of how those concepts combine, or do not, to enable or support the self-development of leaders in the U.S. Army. The conceptual framework shaped my initial coding of data and the structuring of the analytic effort. My results, findings, and recommendations focus on PLNs and connectivism, but I also explore the contributions of the pillar concepts of Web 2.0 technologies, communities of practice, and motivation. Understanding this conceptual framework allowed me to identify themes that emerged from the data outside the expectations of this conceptual framework. Capturing these outliers is an important contribution of the study.

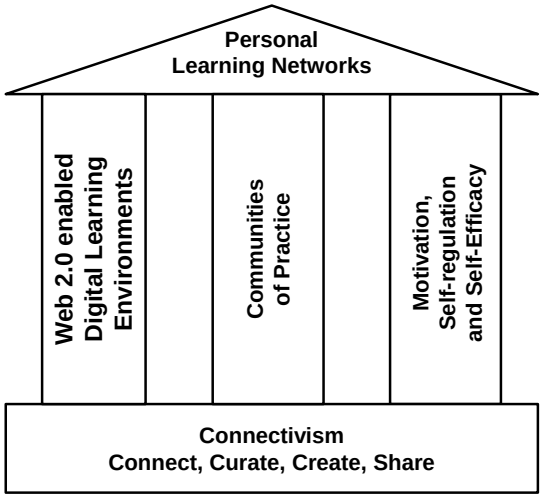

Figure 1. Conceptual framework.

Research Tradition

This study was conducted as a qualitative study employing a case study approach. Yin (2003) has suggested that the case study is an appropriate research method for a particular research effort that investigates a contemporary issue or phenomenon using multiple sources of evidence. He further noted that the case is examined in its real-life context and environment, and that the boundaries between phenomenon and context are not clearly evident.

For the purposes of this dissertation, I understand PLNs as a contemporary phenomenon. Certainly individuals have connected with each other throughout history in order to facilitate learning. However, the individuals' PLNs that employ Web 2.0 technologies were not even possible a decade ago because the technologies simply did not exist. Web 2.0 has provided not only the connectivity to other learners, experts, and sources of information, but also to the applications (apps) that enable the connectivist tasks of connecting, curating, creating, and sharing.

I studied the use of PLNs within the real-life context of a U.S. Army unit and its leaders. The unit from which data was collected was engaged in its normal operations and training activities. The context is that of daily operations by the leadership of a unit in the U.S. Army located at Fort Riley, Kansas. The approximately 45 leaders in the unit spend approximately 50 hours a week in structured activities in and around their unit area on the post. The remainder of the week and the weekend is available for individual self-development.

Because PLNs extend both within and beyond the organization, the boundaries between the phenomenon and the context are not clearly evident. The primary boundary in my study was between the unit and its external environment. The formal external environment consisted of the larger units, brigade and division, of which the unit is a component, or sub-system. While organizationally these boundaries are evident, the connections between each unit leader and external learners, stakeholders, and others are less discernable. The unit and each of its individual leaders also extend the connections of their PLNs outside the military chain of command to other learners, subject matter experts, peers, academia, and sources of information available via the web (blogs, sites, RSS feeds, and other communities of practice).

I used multiple sources of evidence including interviews, focus groups, and participant observation. Interviews were conducted with each respondent after their development and use of a PLN for self-development over a four-week period. During each of the four weeks of learning using the PLN and connectivism, I participated in the learning along with the population. My field notes from participant observation contributed to the data through integration with audio recordings of interviews and focus groups. Each individual learner's PLN was assessed in order to understand the connections the learner made in order to support their learning through a connectivist model.

Case studies are particularly applicable to innovation or examining the implications in changes in the environment. In the case of this dissertation, PLNs are an emerging innovation in education, and connectivism represents an innovative approach to

education (Seimens, 2004). This research examined the impact of Web 2.0 digital learning as a change to the learning environment. The communities of practice component of the theoretical framework also represented the changing learning environment.

Qualitative Approaches That Were Not Employed

Other qualitative approaches were considered, but discarded. Creswell (2007) suggests there are five major approaches to qualitative research design: grounded theory, ethnographic, phenomenological, narrative and case study. The purpose here is to examine an existing theory in a specific context, in this case the military, in order to derive the implications for future application of that theory to self-development in the military context. That purpose was the primary consideration in the selection of a research approach.

A grounded theory approach would be effective, but by producing a theory rather than implications would not be as informative for improving current leader development. The theories of connectivism and PLN exist already; the question for this research is their applicability to a military rather than civilian student population and environment. An ethnographic approach is inappropriate even though the study is being conducted in the context of the military culture. However, that culture is not the objective of the study, but rather the employment of PLN and connectivism by individuals for their own self-development. The phenomenological approach is not appropriate because the study is not about a specific experience, but rather about individualized, distributed learning over time. And, the narrative approach is not appropriate because the study is not about an

individual or small group experience, but rather about learning methodologies applied across a large group (Creswell, 2007).

Role of the Researcher

As the primary researcher I participated in this study through participant observation. As each learner developed their PLN I became a member of that PLN for the purposes of the case study. Guest, MacQueen and Namey (2012) suggest that critical to the analysis of data in support of answering research questions is the *view* of the researcher. Participant observation increased the richness and relevance of my *view*. For example, in order to answer the research question of, "What is the current self-development learning environment in the Army?" a broad view must be taken. An exploratory analysis approach is appropriate for this research effort because the case study is focused on examining, or exploring, the use of PLNs (Richardson & Mancabelli, 2009) for establishing learning environments for individual self-development in Army organizations and to employ those PLNs using an educational approach based on the emerging theory of connectivism.

I am a retired Colonel in the U.S. Army. Despite my military background, I do not have any direct professional relationships with any of the respondents or participants in the case study. I do have much in common with the leaders in the unit who served as the sample for the case study, including; common interests in securing the Nation, a common heritage of the American Soldier, common experiences in unit training and self-development, and a common military cultural viewpoint. This promotes effective interpretation of observations, but can also introduce bias into analysis (Maxwell, 2013).

In accounting for such researcher bias Maxwell cites Reason (1988, 1994) concept of "critical subjectivity," in which the researcher is aware of accounts for their experience and expertise without being overwhelmed to the point they lose objectivity in collection and analysis.

The other source of researcher bias is my own interest in PLN and connectivism. My education concentration is in learning, instruction and innovation. I am motivated to find innovations that will support more effective education and learning in general and U.S. Army leader self-development specifically. This bias was accounted for by having a subject matter expert in Army leader development who was not familiar with PLN and connectivism review the coding drawn from the data collection for bias and the use of nVIVO as a means of using word frequency searches to ensure that analysis was reliable and not affected by bias.

Marshall and Rossman (2006) suggest that the researcher's tacit theory, that is one's personal understanding, must be combined with the formal theory derived from literature to bring the problem into focus. My tacit theory going into the case study is that the individual's motivation is the major challenge to successful learning with PLN and connectivism. The formal theory that supports such is that of self-regulation and self-efficacy. This requires that the case study collect for and analyze the impact of motivation in the use of PLN and connectivism in the context of the leader's self-development within a U.S. Army unit. Structuring the interview protocols and questions in order to systematically collect the necessary data mitigated the risk of researcher bias that may enter into my field notes from participant observation.

Participant Selection Logic

In order to examine the applicability of PLNs to self-development of Army leaders using a connectivist approach the qualitative study was conducted using volunteer respondents from the leadership of a unit in the United States Army as the sample. Data collection will primarily be interviews, focus groups and participant observation. Data was collected over four weeks of employment of PLNs in order to improve the themes derived from resulting analysis of the data. A criteria-based sampling strategy was used to choose which Army units would be studied based on the unit not being currently deployed, has executed a planning cycle, and readily available for sampling. Sampling was also purposive in that selecting a unit manned according to the Army-wide processes ensures a fair representation of any like unit in any active Army Division. A limitation of the research is that the research sample did not include National Guard or Army Reserve elements. Such samples will have to be addressed in later research.

Much of the design of the sampling strategy for this dissertation research project was driven by the organization of the Army. The Army and its nested leaders are organized into echelons, each of which is organized roughly the same as its components, but at each successively higher level is larger. A company is nested within a unit, a unit is nested within a unit, and a unit is nested within a division. For this case study I have selected the unit level as a within case sampling (Miles, Huberman & Saldana, 2014). Combined arms units, nested within combined arms brigades are similar in rank structure, population and demographics across the entire Army. There are approximately 450 combined arms units, each with approximately 20-25 Lieutenants, 10-15 Captains and 3

Field Grade officers. That makes a sample size of between 20 and 30 that is representative of the other combined arms units in the Army.

The sample size must be large enough to for a community of practice. Communities of practices are groups united by a common interest (Wenger, McDermott, and Snyder, 2002). The unit is a natural community of practice since it represents officers with common interests and common tasks that are already linked by organization. The key was transforming them to a Web 2.0 technology enabled, connected community of practice. Connectivism also requires a sample large enough for connections and networks to form. The unit level population of 40-45 is large enough for connected learning to occur. The unit level sample then, within a case study format, appears to be large enough to examine the three components of PLNs, connectivism and communities of practice and large enough to collect the data required to answer the research questions.

Accounting for variations in manning at any one time the sample size enables sufficient interviews and focus groups to collect the rich, varied and deep data for analysis. From the overall leadership of the unit volunteers were elicited to participate in focus groups and interviews. All volunteers to participate must have been in the Army for at least one year, in order to ensure they have experienced the current Army self-development environment and methodology. Two focus groups were conducted, each with four participants. One focus group consisted solely of lieutenants and one solely of captains. Each focus group consists of leaders with the same rank, so there is no possibility of undue command or seniority influence in the conduct of the focus group. In this way each respondent felt free to provide honest answers without fear of pressure

from the chain of command. Fourteen individual interviews were conducted with captains, majors and lieutenants. The individual interview respondents didnot participate in the focus groups or vice versa. The total sample size was 22 persons. Given the population in the case study of 40-45, there are sufficient individuals to ensure that the 22 required participants were available, accounting for illness or other absences.

Instrumentation

In order to collect the data required to answer the project's research questions each participant in the study participated in an interview or a focus group at the conclusion of one month's experience employing PLNs for self-development. Each interview or focus group started with the same set of questions (See Appendix A for Interview and Focus Group Protocols) although each interview ultimately took a different course as answers are provided to the base set of questions (Miles, Huberman & Saldana, 2014). Following the in brief and obtaining the respondents consent, the interview or focus group began with a *tour question.* Following the tour question and based on the initial response one of the *main questions* was asked. Respondent answers to main questions signaled the use of *follow-on questions* or the transition to another main question (Rubin and Rubin, 2012). Given the research sample, this set of interviews and focus groups provide sufficient data for analysis, findings and conclusions. Each learner in the sample population created a PLN. Those networks analyzed in order to map the networks and analyze the connections and nodes. After receiving appropriate consent by respondents, all interviews and focus groups were be recorded by audio (Creswell, 2003)

and subsequently transcribed for analysis and input into LiveScribe for digital analytic support.

Participant observation was critical to execution of this research. The researcher connected to each of the sample population learners and prepared field notes based on interactions with the learners through their PLN. The organization of field notes was structured according to the interview protocols. The researcher's field notes served as another source of data and were analyzed with the same rigor as the data collected from other respondents.

Data Analysis Plan

In designing the analysis of this case study's data, Marshall and Rossman's (2006) seven phases of analysis were considered. These include: (1) organizing the data; (2) immersion in the data; (3) generating categories and themes; (4) coding the data; (5) offering interpretations through analytic memos; (6) searching for alternative understandings; and (7) writing the report or other format for presenting the study. The strategy for data analysis should be centered on the theoretical basis of the study, in the case of this study the conceptual framework (Yin, 2003).

I anticipated using both analog and digitally-supported analysis of the data using NVivo software, but adjusted to use of Livescribe as explained in Chapter 4. Analysis of data included logical analysis/matrix analysis to determine the general pattern of application of PLNs. Analytic induction was used to determine why respondents employed PLNs and connectivism as they stated and to discover exceptions to the pattern that emerges. Domain, discourse and narrative analysis were also used to refine the

identification of best practices and challenges to adoption of PLNs as an Army learning environment for self-development. Qualitative data analysis included the use of LiveScribe, a CAQDA program to generate, among other things, word frequency queries to understand what leaders state about PLNs.

The coding strategy taken in this study supports a case study approach and be critical to reliable findings and includes open coding, axial coding, and selective coding. Open coding was used to explore ideas found in the literature, interviews, focus group results, and artifacts. Axial coding was used to develop the interconnections among the categories found an open coding. Finally, selective coding was employed whereby the core or fundamental codes determined especially relevant are intensively analyzed through constant comparison of instances that represent the categories or themes to achieve saturation (further investigation yields no new insight into the category). Ultimately, coding reliability depends on how well the codes remain stable, are reproducible, and accurate. Using CAQDA software enables consistently coded information of a like nature using themes and case nodes that do not change over time individually (stability) or across the team (reproducibility) and are faithful to standardized meaning (accurate).

Issues of Trustworthiness

Credibility (Internal Validity)

Potential limitations to this study include validity and reliability. Maxwell (2013) suggests that the researcher must address validity threats after a tentative conclusion, in this case the themes, has been made. Maxwell also identifies research bias and reactivity

as two major validity threats. Applying Maxwell's validity test checklist (Maxwell, pp. 125-129) will improve validity, including:

- Intensive long-term involvement – The research period was approximately two months, long enough for researcher and respondents to become familiar with each other and reduce validity errors from single source observations.
- Rich data – Using field notes to capture rich observations and audio recording interviews assisted with the richness of the data.
- Respondent validation – Checking initial observations, themes and analysis against later interviews and interviewees to validate conclusions.
- Recording discrepant evidence and negative cases – Ensuring that discrepancies and negative data were accounted for demonstrably in the written dissertation improved validity.

Miles, Huberman, and Saldana (2014) provided additional tactics for improving validity of qualitative research. Among those are context-rich and meaningful descriptions, and triangulation across multiple respondents.

Transferability (External Validity)

Transferability was established in part through the selection of participants. The sample employed is consistent with that of units across the Army in terms of age, experience, rank, and distribution. The Army uses a standard organization and assignment of personnel for combat arms brigades, of which there are 77 across the Army at the time of data collection and thus the sample is representative of all those units

Transferability was reinforced through the use of multiple levels of expertise and education in the sample population: Majors and Lieutenant Colonel who had graduate-level education; Captains who had completed the Army's career course and Lieutenants who had only Baccalaureate and Army Basic Course education.

Dependability (Reliability)

Reliability accounts for whether the study process is consistent across times in terms of research, data collection, analysis and methods. Reliability was improved through: clear research questions, explicitly described role of researcher, meaningful parallelism across data sources, and data quality checks accounting for bias (Miles, Huberman & Saldana, 2014). Guest, MacQueen and Namey (2012) suggest structure of interviews and analysis enhances reliability. Accordingly, a standardized interview and focus group protocol (Appendix A) was employed across every data collection interview or focus group.

Confirmability (Objectivity)

Confirmability was achieved through the employment of several means. First was the triangulation of multiple rich sources of data in the analysis, including the interviews, participant observation field notes and analysis of the networks. Sources of data for analysis were "thick" in terms of the detail in the interviews and field notes (Miles, Huberman & Saldana, 2014). Negative evidence, particularly instances where respondents did not believe that PLN and connectivism contributed to their self-development or when the use of PLN "took too much time" were captured and detailed in the analysis and findings of the research.

Ethical Procedures

In order to protect the human subjects in this research the researcher completed and documented on-line training in human subject protection. The research, data collection and human subject protection were approved by the Walden Institutional Review Board (IRB) before data collection began. Walden University's approval number for this study is 01-09-15-0294394**.** Prior to participation, each respondent was briefed on the project, its implications, purposes, conduct and the opportunity to opt out at any time. Privacy act and informed consent forms were read, discussed and signed if the respondent agrees to participate. A separate consent for was signed for both written and audio recording of interviews.

Subjects are identifiable directly or indirectly. Subjects were given a code from a table of random numbers and identifying information in association with the code was deleted from the record to ensure anonymity. Responses from individuals were aggregated into appropriate groups, such as rank across units, to ensure indirect identification highly unlikely. Interviews were audio recorded, with a separate signature line provided for consent. No minors are involved in this research

Researcher will ensure that any Soldier's consent to participate is obtained out of the presence of their chain of command. I described the purpose of the research and explained that their participation is voluntary. Superiors of service members (e.g., unit officers, senior NCOs, and equivalent civilians) in the chain of command were not be present at any time during data collection. This includes not being present or interfering with recruitment or consent to participate. If the superior to a respondent participated in

the study, his or her recruitment, consent and participation was separate from the subordinate. Records of informed consent and privacy are maintained separate from data, with no corresponding identification in either location.

Summary

The case study methodology described in this chapter centered on the application of the theoretical framework to research that was grounded in the principles of qualitative research design. Sampling, human subject protections, and data collection and storage efforts will ensure that the treatment of all respondents is ethical. The use of multiple sources of data across a statistically significant sample population provided sufficient data for the analysis of thick and content-rich data. Comprehensive and integrated analysis and measures to affect reliability and validity ensured that the findings and recommendations are scientifically and academically sound. The chapter that follows describes the results of the implementation of this research methodology in this case study.

Chapter 4: Results

This chapter presents the results of the data collection, analysis, and findings of this study. This study is organized as a qualitative case study research paradigm in order to explore the application of innovations in civilian education to the self-development of leaders in the U.S. Army. The specific innovations being explored are the use of PLNs and the connectivism theory of learning. In order to conduct this exploration, I employed the following research questions:

- What are the implications of adopting PLNs as the self-development learning environment in the Army?
- In what ways does a connectivist approach improve self-development in Army units?
- How can the use of PLNs and connectivism contribute to the self-development of critical and creative thinking skills, meta-cognition and problem-solving skills in Army leaders?

This chapter has three major components. It starts with a description of the data collection that I conducted in support of the research. The second major component of this chapter is describes the data analysis to include evidence of trustworthiness. The third component of this chapter is the results of the analysis. The results of the analysis are further divided into two major sections. One section includes the themes derived from the analysis. The second section includes the findings relating to the three research questions. The results section leads into the next chapter, in which I present the findings, limitations, implications, and recommendations of this study.

Setting

The Army unit that was the source of data for this case study had recently returned from a year-long overseas deployment to a combat zone. Prior to that, the unit had been primarily engaged in training at their home station, although it had also conducted a month-long field training event at the National Training Center, Fort Irwin, California. Thus, the individuals who participated in the study had been together for more than a year, and had conducted significant organizational training and leader development together. At the same time, the opportunities for individual self-development had been limited because of the leaders' intensely busy work schedules over the past two years. I conducted the case study after the leaders had returned from a post-deployment vacation and had a period of relative stability in which to focus more on self-development.

The Case

I studied the execution of a unit self-development program in which participants employed both a PLNPLN and the connectivist methodology in support of learning. Given the focus of the unit leadership on mission command, the case study began with a facilitated discussion of military leadership, theory, and innovation. Following this introduction, each officer developed or adapted their PLN to account for the subject of mission command and their own particular topic of interest. Each officer connected with other learners, and used such sources of information as web sites, blogs, videos, and groups. Groups are communities of practice on a particular social media forum such as Facebook or Linked-In. Each officer then curated specific artifacts from these sources of

information. Such artifacts included videos, articles, military regulations and doctrine, books, and blog entries. Next, officers created new knowledge in the form of an artifact by synthesizing what they had curated with their own existing knowledge and personal experience. Finally, each officer shared the new knowledge they had created with the other participants in the case. Sharing of knowledge was accomplished through one of three means: an email group, Twitter, or Padlet. A Padlet is a blank wall established on the web to which invitees can post artifacts, links or comments. A representative Padlet is shown at Figure 2.

After sharing their knowledge, an iterative process took place as various officers reflected on what others had created and either commented on or synthesized the new

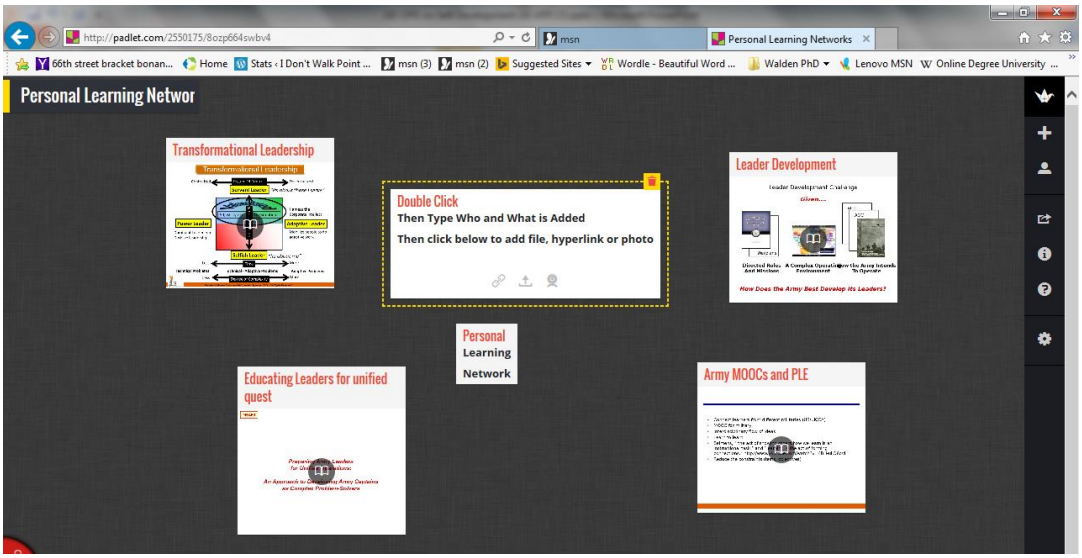

Figure 2. Example Padlet used by Army leaders in self-development case.

artifacts they received with what they then knew to again create new knowledge and artifacts. The overall execution of the methodology in the case is reflected in Figure 3.

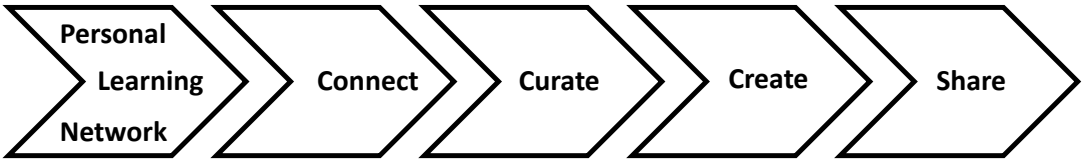

Figure 3. Sequence of actions employed by participants in the case

Demographics

I collected data from a total of 22 respondents who were active duty officers in the U.S. Army. All participants were volunteers who had experience with leader self-development. Ten participants were lieutenants who had completed Army institutional education at the Basic Officer Leader's Course. Eight participants were captains who had completed Army institutional education at the Captains' Career Course. Four participants were majors who had completed Army institutional education at the Command and General Staff College. One respondent possessed a Doctorate Degree, five possessed Masters Degrees, and the remainder possessed Bachelors Degrees. Of those interviewed, three lieutenants and one major were female. The other 18 respondents were male.

Participant Overview

Below is a brief description of the respondents who participated in the study. In order to preserve their anonymity and conform to human research protection requirements, each respondent was given a pseudonym. The pseudonyms are in alphabetical order in the order in which the interviews were conducted.

- Lieutenant Audrey: A lieutenant in a combat service support branch who is in her first assignment in the Army. She is highly motivated for self-development and working on her Masters Degree.

- Major Becky: A major in a combat service support branch who has served in the United States, Korea, and Afghanistan. She is a student of leadership practices and ideas from the commercial sector that can be imported into the Army.
- Lieutenant Charlie: A combat arms officer who is on his first assignment, and who is a senior lieutenant about to be promoted to captain. He is very active using social media for learning.
- Major Doug: a combat arms officer who has served in the United States, Iraq, and Afghanistan. He has been in both operational and institutional units and served in a leader development organization.
- Lieutenant Ed: A combat support branch officer who is interested in learning about other cultures.
- Major Frank: A combat arms officer who has served in both operational and institutional organizations and has been assigned to an institutional leader development organization.
- Lieutenant George: A West Point graduate who is a combat arms officer. He has not been in combat, but has deployed to the Middle East for a defense mission. He is very interested in learning about public policy and international affairs.
- Major Hal: A well-educated officer who has attended graduate school and is actively employs social media in support of his own self-development and the learning of others.

- Lieutenant Ike: Slightly older than the typical combat arms lieutenant, he worked after college before joining the Army. He is very interested in leader development and talent management.
- Captain John: A combat arms officer, he is quiet, smart, hard-working and thus far has not made a strong effort during his career in his own self-development.
- Lieutenant Kelly: She is a combat service support officer and the most junior respondent. She is in her first position in the Army, but did deploy with the unit overseas for a support mission.
- Captain Lou: He is a combat support officer who served in the United States and Afghanistan. He is motivated to learn about his profession, especially military history.
- Captain Mel: A combat service support officer highly motivated toward personal self-development. She has a Masters Degree and is working on a second Masters Degree.
- Captain Young: Combat support officer who has served in the United States, Kuwait, and Afghanistan.

The next four Lieutenants participated in a focus group, rather than individual interviews.

- Lieutenant Neil: He is a combat arms officer who has served as a platoon leader. He is an active video gamer and is also active on social media.
- Lieutenant Oscar: He has served in both the United States and Kuwait. A combat arms officer, he focuses his self-development on learning the tactics and techniques of combat.

- Lieutenant Pete: A combat arms officer, he has served in both Kuwait and the United States. He is focused on learning about leadership, talent management, and counseling.
- Lieutenant Rob: He is a combat service support officer who is interested in learning about the combat arms in order to provide better support.

The next four captains participated in a focus group, rather than individual interviews.

- Captain Steve: He is a combat support officer who has served in two different units. He was an enlisted man before commissioning, and so is somewhat older than the average captain.
- Captain Tim: He is a combat arms officer, serving in a staff position. He is very active in social media and regularly connects to others external to the unit.
- Captain Victor: A combat arms officer currently in company command. He is motivated to develop his junior leaders, primarily through face-to-face efforts.
- Captain Will: A combat arms officer on his third assignment. He served in Korea, Afghanistan, and the United States.

The participants are aggregated in Table 1 below:

Table 1

Description of Participants and Pseudonyms

NAME	RANK	SPECIALTY	EDUCATION
Audrey	Lieutenant	Service Support	Masters
Becky	Major	Service Support	Doctorate
Charlie	Lieutenant	Combat Arms	Bachelors
Doug	Major	Combat Arms	Masters
Ed	Lieutenant	Combat Support	Bachelors
Frank	Major	Combat Arms	Masters
George	Lieutenant	Combat Arms	Bachelors
Hal	Major	Combat Support	Masters
Ike	Lieutenant	Combat Arms	Bachelors
John	Captain	Combat Arms	Bachelors
Kelly	Lieutenant	Service Support	Bachelors
Lou	Captain	Combat Support	Bachelors
Mel	Captain	Service Support	Masters
Young	Captain	Combat Support	Bachelors
Neil	Lieutenant	Combat Arms	Bachelors
Oscar	Lieutenant	Combat Arms	Bachelors
Pete	Lieutenant	Combat Arms	Bachelors
Rob	Lieutenant	Service Support	Bachelors
Steve	Captain	Combat Support	Bachelors
Tim	Captain	Combat Arms	Bachelors
Victor	Captain	Combat Arms	Bachelors
Will	Captain	Combat Arms	Bachelors

Interview Protocol Pilot

Prior to beginning data collection and after IRB and ARHPO approval, I piloted the interview protocol with four volunteers not connected with the case. All four were former military, retired, senior officers with experience in leader development and research. For each of the four individuals, I conducted the interview in the same manner as the formal interviews that followed. I described the study obtained permission, asked questions, provided answers and recorded data with field notes and audio. The pilot

provided me an opportunity to practice with the LiveScribe system, which I had not used until then. No changes were made to the interview protocols as a result of the pilot, but it did provide an opportunity for practice in timing questions, eliciting answers, and asking follow-up questions.

Data Collection

Based on the organization of the unit, the availability of personnel and the unit schedule, a total of 43 officers and warrant officers participated in the application of PLNs and connectivism to self-development case. From that group volunteers were elicited and data collection was conducted in accordance with the data collection plan detailed in Chapter 3. All interviews were conducted after written consent for both written and audio data collections had been received from the respondents. Data were collected from twenty-two officers over a four-week period following execution of the self-development case.

Each interview or focus group lasted approximately two hours. Interviews began with verbatim reading, confirmation and signing of the consent form at Appendix B. Such consent included a description of the study and its purpose, procedures to be followed during the interview or focus group, voluntary nature of the study, risks and benefits, privacy and contacts and questions. Following the signature of consent, interviews and focus groups were conducted using the protocols contained at Appendix A. Each interview began with the tour question, then proceeded to the four main questions. As officers answered the main questions follow-on questions were used to explore specific responses, ideas, concepts or quotes in more depth. Depending on the

flow of the interview or focus group and the specific topic, either the follow-on questions in the protocols were employed, or new follow-on questions were asked to broaden or deepen the data being collected or to explore new avenues of inquiry suggested by the responses of the participant.

Interviews and focus groups were conducted face-to-face, except for four interviews that were conducted over the phone due to availability of the respondent. All interviews and focus groups were conducted indoors in an office or conference room. During each interview or focus group the researcher took notes in a notebook and simultaneously collected audio recording of the data collection employing a Livescribe pen. After each data collection session, the notes and audio were downloaded to a computer using the Livescribe software and converted to pdf and audio files for use in data analysis and as the final records that would be kept of each interview and focus groups. Respondents were numbered consecutively in the notes and digital files to preserve anonymity.

Data Analysis

The strategy for data analysis centered on the theoretical basis of the study, in the case of this study the conceptual framework (Yin, 2003). That conceptual framework contained five elements: PLNs; connectivist methodology, motivation, Web 2.0 technologies, and communities of practice. In considering those five elements of the conceptual framework the analysis was informed by the learning about each of those conceptual elements that occurred during the literature review.

Data analysis began with organization and immersion in the data (Marshall and Rossman, 2006). Since 35% of Army leaders surveyed in the annual Center for Army Leadership Survey of Army Leadership (CASAL) reported that their organizational environment was not conducive to learning (Riley, et al, 2012), logical analysis was used to determine the respondents' view of Army self-development. Logical analysis enabled the grouping of associated comments to derive a sense of the respondents' general beliefs about how conducive their organization was to self-development (Bloor & Wood, 2006). Analytic induction was employed to develop and then examine hypothesis as to why and how respondents employed PLNs and connectivism and to discover exceptions to the pattern that emerged. Domain, discourse and narrative analysis was used to identify implications and challenges to adoption of PLNs and connectivism as an Army learning environment and methodology for self-development.

The original analysis plan was to employ NVivo, a CAQDA program in support of data analysis. The intent was to generate, among other things, word frequency queries to understand what leaders state about PLNs. The researcher had experience with the use of NVivo both in academic work with Walden University and in the conduct data analysis during qualitative research in support of the U.S. Army Research Institute. NVivo and similar programs support analysis, but do not fully automate analysis, the researcher must still manually manage the data and execute the analysis beyond key word searches. NVivo also does not support data collection, but relies on transcribed data to be input into the system.

However, in preparation for data collection the researcher was introduced to another CAQDA system, the LiveScribe. LiveScribe is an audio pen that audio records the interview or focus group at the same time that the research is writing his field notes with the pen. Written on special paper, this enables the connection of field notes with the exact words of the interviewee at the time that field note was written. This greatly aids in coding, the identification and location of specific quotes that support field observations, and the transcription and manipulation of data after the audio and written field notes are both downloaded to a computer using the LiveScribe software. Once audio and field notes are downloaded to the computer the files were searchable and managed, enabling many of the features of NVivo. While LiveScribe software currently lacks the representation capabilities of NVivo, the researcher concluded that the ability to crosswalk field notes, codes, categories and quotes in support of data analysis was more important than the presentation features of NVivo. Accordingly, LiveScribe was used in support of data collection and analysis, rather than the originally planned NVivo.

Open Coding

The coding strategy taken in this study supported a case study approach and be critical to reliable findings and will include open coding, axial coding, and selective coding. Open coding was used to explore ideas found in the literature, interviews, focus group results, and artifacts. Codes derived from the literature review included those related to the theoretical framework for the study and the principles of connectivism. The majority of the codes emerged from the initial immersion in the data from the interviews

and focus groups. The initial codes derived from the first-cut coding (Patton, 2002) are detailed in Appendix C.

Axial Coding

Axial coding was used to develop the interconnections among the categories found an open coding. Connections between codes were placed in context, with the contexts largely derived from the comments of specific respondents and the experience of the observer. Context was sometimes broadly that of the Army in general, but more often more narrowly the unit within which the individual respondent was or had served. Identification and interpretation of these connections resulted in the development of the themes derived from the analysis. Axial coding also revealed patterns of interactions that are relevant to self-development of Army leaders. Generally, three patterns emerged:

- Interactions between the individual and the unit's leadership.
- Interactions between the individual and other learners.
- Interactions between the individual and web-based artifacts and tools, such as blogs, videos, articles, or social media systems.

At Figure 4 is an example of axial coding from this analysis that accounts for all three interactions; unit leaders, individual and web-based.

As a result of axial coding the following six themes emerged:

- Lack of Army support for leader self-development
- Challenges to current self-development practices
- Intrinsic motivation necessary for self-development
- Structuring PLNs around small groups

- Value of virtual self-development relative to face-to-face
- Desired characteristics for self-development solutions

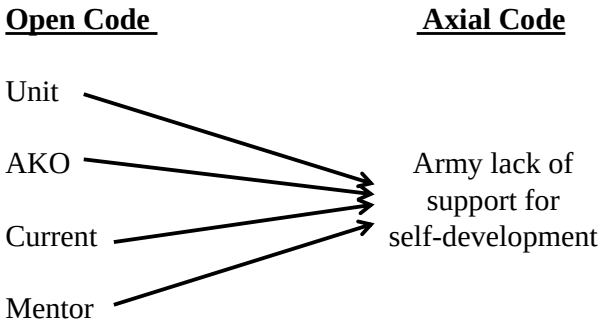

Figure 4. Example of Axial Coding

Selective Coding

Selective coding was employed to derive the core determined especially relevant to Army self-development employing connectivism. This code was determined to be the characteristics that respondents desired in their self-development environment and methodology. That code was intensively analyzed through comparison of instances across all respondents that represented the categories or themes to achieve saturation (further investigation yields no new insight into the category). In the case of the "desired" code, six codes emerged that further described the code and linked "desired" to the other codes derived from open coding and analysis. Those six were: available, portable, scalable, tailorable, exportable, and relevant. At Figure 5 is the selective coding that enabled analysis of the six characteristics.

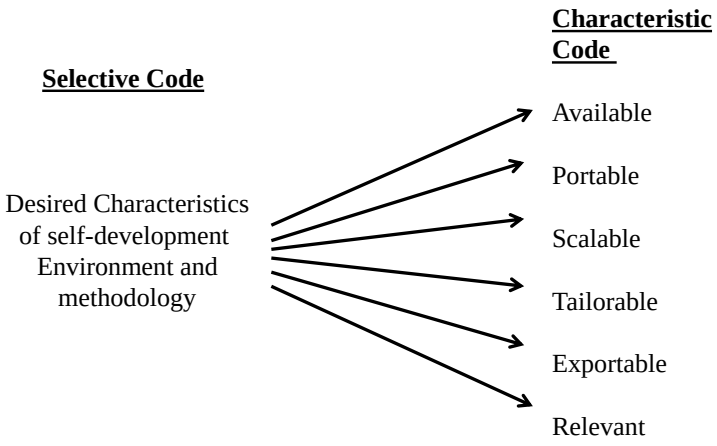

Figure 5. Selective Coding

Ultimately, coding reliability depended on how well the codes remain stable, are reproducible, and accurate. Through three iterations of analysis and through open, axial and selective coding information of a like nature did not change over time individually (stability) or across the set of respondents (reproducibility) and were faithful to standardized meaning (accurate) established during the initial coding.

Discrepancies in Data

Out of the 22 respondents there were two major discrepant categories. One was motivation. There was a Lieutenant Neil and Captain John both stated they were personally not motivated to engage in self-development. The Captain John stated, "I'm more of the lazier person, so I don't take self-development that seriously. I do research when the need arises, usually in response to a tasking." This motivation discrepancy was reinforced by the lack of volunteers from the original case. While there were 43 participants in the case, only 22 completed all five components of the leader self-development case and each of these volunteered to participate in the interviews and focus groups. None of the 21 leaders who failed to complete all five components volunteered

for data collection. This lack of completion did not affect the case study data collection, since the initial intent was for 22 respondents and that quantity was met. Additionally, this discrepancy is actually consistent with the literature review, which suggested that self-regulation necessary to complete MOOC is extremely low. Garcia, Tenorio & Ramirez (2015) found that of more than 17,000 persons enrolling in a MOOC, less than 5% participated regularly. So, the approximately 50% completion of this case, which resembled a MOOC in structure, if not in length, was better than would be expected.

The second discrepancy was in what Web 2.0 technologies and social media were used. Major Frank stated,

> I don't use social media because to me there is a difference between publishing in social media, such as Small Wars Journal (an on-line journal) and publishing in a formal publication, such as Military Review…Military Review provides the capability for design thinkers to get radical ideas into print, while Parameters requires peer-review, which raises the bar of the quality of the paper. Small Wars Journal has a much lower bar for quality and results in some articles that are PhD level and some that are very low quality and probably shouldn't be published.

Major Frank was logical in his objections to learning sources that were on-line, but in general his responses reinforced the themes that emerged from the responses of other interviewees. That major was also the only respondent who spoke in opposition to the use of social media and on-line sources. His objections, expressed in terms of quality, are important to the analysis because they support some of the objections by academics to connectivism (Bell, 2011).

Evidence of Trustworthiness

Credibility (Internal Validity)

Maxwell's (2013) validity test checklist was adhered to in order to ensure validity. This began with intensive long-term involvement in the research, which included a month of case study plus a month of data collection, followed by a month of data analysis. This provided sufficient time for researcher and respondents to execute the case and reduce validity errors from single source observations. Rich data as demonstrated by context-rich and meaningful descriptions, was gained by using field notes to capture rich observations and audio recording interviews that assisted with the richness of the data. The LiveScribe audio pen system was employed, enabling the researcher to listen to what the respondent was saying at the exact moment the researcher was writing a particular field note. This enabled effective crosswalk during analysis between what the respondent was saying and the observations and insights of the researcher.

Respondent validation was achieved by checking initial observations, themes and analysis against later interviews and interviewees to validate conclusions. Coding consistency across respondents, in terms of codes being represented by the comments of multiple interviewees in response to the same prompt, supported that validation. Discrepant evidence was recorded and has been analyzed and accounted for in the results, while negative cases were noted in the data analysis section. Both discrepancies and negative cases were also compared to relevant insights from the literature review. Triangulation of results across multiple respondents was in evidence during coding and

analysis and supported by multiple quotations from disparate respondents in support of each theme.

Transferability (External Validity)

Transferability of analysis to other Army units was achieved through three means. The first means addressed the challenge of reactivity, which is the potential that respondents will act differently because the case was different than normal leader development activities in the unit (Patton, 2002; Frankfort-Nachmias and Nachmias, 2008; & Neuman, 2007). The case was conducted using traditional Army leader development means and capabilities such as computers and software that are available to any unit in the Army. In this respect the officers learned within the context with which they are familiar. The second means to achieve transferability was largely through the selection of participants. The sample employed is consistent with that of units across the Army in terms of age, experience, rank, and distribution. Transferability was reinforced through the use of multiple levels of expertise and education in the sample population: Majors who had graduate-level education; Captains who had completed the Army's career course and Lieutenants who had only Baccalaureate and Army Basic Course education. The third means of achieving transferability was through transparency on the part of the researcher in terms of the research methodology. Leaders within the case unit were given an overview of the research project, specific instructions for execution of the case in terms of their PLNs and connectivism, description of the data collection and analysis, and description of how results would be described. This step-by-step approach

to transparency contributes to the transferability, or external validity of the research project.

Dependability (Reliability)

Reliability accounts for whether the study process is consistent across times in terms of research, data collection, analysis and methods. Reliability was achieved through: clear research questions and interview/focus group protocols, explicitly described role of researcher, meaningful parallelism across data sources, and data quality checks accounting for bias (Miles, Huberman & Saldana, 2014). Guest, MacQueen, and Namey (2012) suggest structure of interviews and analysis enhances reliability. Accordingly, a standardized interview and focus group protocol (Appendix A) was employed across every data collection interview and focus group. Interviews and focus groups always began with the tour question and then proceeded logically through the main and follow-up questions leading from the environment of learning to the methodology of connectivism and then finally to the thinking skills. This consistency enhanced the dependability of the analysis.

Confirmability (Objectivity)

Confirmability was achieved through triangulation of multiple rich sources of data in the analysis, including the interviews, participant observation field notes and analysis of the connections described by the respondents. “Thick” data was collected, in terms of the detail, through the structure of the sample population, which enabled vertical triangulation across military ranks and age and horizontally across branches and specialties. Negative evidence, particularly instances where respondents did not believe

in their role in self-development or when the use of social media as learning sources was not supported were captured and detailed in the analysis and findings of the research.

Ethical Procedures

All measures described in the research proposal and in the Institutional Review Board (IRB) documentation were executed in order to protect the human subjects in this research. Additionally, because the respondents were members of the U.S. Army, all IRB documentation was provided to the Army Human Research Protection Office (AHRPO) for approval before any data collection began.

The researcher ensured that any Soldier's consent to participate was obtained out of the presence of their chain of command. Superiors of service members (e.g., unit officers, senior NCOs, and equivalent civilians) in the chain of command were not present at any time during data collection. This included not being present or interfering with recruitment or consent to participate. If the superior was a respondent and participated in the study, his or her recruitment, consent, and participation was separate from that of any participant subordinate. Records of informed consent and privacy are maintained separate from data, with no corresponding identification in either location.

Results

The results of the data analysis are presented in two major sections. The first section addresses the six themes that emerged from the axial and selective coding and subsequent analysis. Each theme is developed and supported by multiple quotes from the respondents. The second section presents the findings in terms of each of the research questions. The findings are supported by quotes from respondents or references to quotes

that were presented in the first section theme development. The development and support of the six themes is immediately below.

Lack of Army support for leader self-development

With few exceptions, most respondents felt the Army did not fully support self-development. In describing the lack of Army support for leader self-development most respondents focused on the environment of unit that they were in at the time. Major Hal was disappointed in his leader's support for self-development and stated, "I received informal advice from my last boss to get off social media." Lieutenant Audrey stated:

> In my eyes the Army isn't too supportive of leader development. I've had leaders who knew I was trying to take courses that would develop myself and they considered it "selfish." So, I had to sneak around and be quiet in order to develop myself.

Officers who had been in more than one unit had mixed experiences in terms of the level of support for their self-development activities. Lieutenant Charlie noted, "The Army has an unhealthy relationship with self-development. A poor leadership environment hampers self-development." He added, "Those who study on the side are ridiculed as 'learners' or 'strivers'." Lieutenant Charlie went on to describe mixed experiences in two successive units.

> My former commander was so controlling that there was no opportunity for self-development. Any motivation to improve was crushed by careerism. My current unit is better, with a much more supportive culture for self-development. I feel

like that is directly due to the field grade officers. Company grade officers are so buried in work its difficult for them to be the guiding post for self-development.

Lieutenant George, a West Point graduate with a longer perspective on shifting support for self-development in different units, observed:

> Everyone at West Point cares about your self-development. So, when I graduated I had that idea in my mind that my leaders and senior leaders had my self-development in mind. But, that was a misnomer. Out in the Army no one cares about your self-development. They care that you learn what they want you to know.

Other officers suggested that Army self-development in many cases wasn't "self" development at all. Major Doug noted, "guided self-development modules are pre-scripted and are just additional schools." Lieutenant Ike remarked, "the way we do things is the focus of self-development." Captain Lou reinforced this theme simply, "Self-development in the Army is limited to Officer Professional Development classes. That isn't self-development at all." Similarly, Lieutenant George observed, "Army self-development is like pie in the sky, it exists, but then again it doesn't."

Challenges to current self-development practices

One of the challenges to current self-development practices noted by multiple respondents was that of existing information technologies in use by the Army. Multiple lieutenants in particular noted that the Army Knowledge Network (AKO), which is supposed to be the Army technology for employing communities of practice and accessing information was outdated and hard to use. Captain Lou stated that, "Junior

officers feel that the Army self-development tools are contrived…websites from both FORSCOM (Forces Command) and TRADOC (Training and Doctrine Command) are lacking in focus and objective." Lieutenants and captains both noted that the Center for Army Lessons Learned (CALL) website, one of the main sources of best practices across the Army, was too hard to use. Lieutenant Kelly admitted to never having heard of the CALL website. Captain Mel observed, "The military doesn't keep up with the times. You have to go outside the military to learn and bring that learning to bear."

Another challenge is that of connecting through the Army closed-loop Nonsecure Internet Protocol Router Network (NIPR) that is mandated for use in virtually all Army units and staff offices. Lieutenant Audrey observed, "You can't get on YouTube or Twitter from NIPR. That is kind of silly. Our government restrains us from getting to the things we need to learn and which our opponents can learn." Captain Mel stated, "for the last four years where I have worked I have had no access to social media." Several leaders stated they brought their personal laptop or tablet to work and connected to hotspots outside the NIPR in order to be able to connect and learn what they needed to learn.

Another challenge is that of the constant rotation of personnel. Because current Army self-development approaches are conducted within the unit and connections are largely face-to-face among those assigned to the same post, the constant rotation of leaders from assignment to assignment adversely affects self-development. Several respondents noted that they connected to potential mentors, particularly field grade officers for young lieutenants and captains, only to have those potential mentors be

assigned elsewhere. Major Becky stated, “I’ve had bad luck with long-term mentorship. People come and go, but don’t stick.”

Time available is also a challenge to current self-development practices. Many units employ OPD as the primary self-development approach, which as was already noted really is not self-development, but rather formal leader development. Even then, training calendars that are full often cause the cancelling of the OPDs. Other officers, motivated toward self-development, simply don’t have the time. Major Hal noted, “My self-development has now transitioned back to just reading books. I no longer have the time to blog or research topics of interest.” Captain Lou admitted, “Now that I have children I have to be more creative with my self-development. I listen to podcasts and YouTube a lot, because I don’t have time to sit down and read a book.”

Another challenge is that of the Army trying to formalize self-development. There was universal agreement among all respondents that self-development must be just that, learning in the subjects that the individual wants to learn through the means the individual wants to employ. Major Doug said, “The Army just needs to get out of the way and let people learn what they are passionate about.” Lieutenant Ed stated, “The Army has to turn self-development on its head. You tell the institution what you want to learn.”

Intrinsic motivation necessary for self-development

Results of the literature review were clear about the importance of motivation and self-regulation for effective use of PLNs and connectivism. Those respondents who were interviewed all stressed the importance of intrinsic self-motivation for self-development. Captain Steve stated a key motivation mentioned by other respondents, “I am going to be

in charge of the lives of Soldiers in combat, I have to learn everything I can." Lieutenant Ed suggested, "It is flawed for the Army to mandate self-development. People have to be motivated internally, they have to want to do it." Major Frank was clear, "I am a self-motivated learner. I learn best through experimentation. I learn the book and then I throw it away and try something different."

Mentoring by more senior leaders also was a key motivation for self-development. Major Doug observed, "My commanding general took an interest in mentoring me. His example motivated me to work harder at my own self-development and to seek out more mentors." Lieutenant Ike stated, "My professor and academic advisor for counter-terrorism in college is still my mentor." Captain Mel noted:

> There is a desire by the Army to instill real mentorship, but that is lost in execution. Too often the senior waits for the junior to make contact. Senior leaders need to want to be mentors and seek out the junior first.

At least one respondent was both intrinsically and extrinsically motivated toward self-development. Captain Lou stated:

> Fear of failure motivates my self-development. I don't want to fail in an important mission because I didn't know enough. And, this is a competitive business. You have to learn to be competitive with your peers. Plus, we romanticize about leadership. We want to be the best leaders we can be.

Structuring PLNs around small groups

One of the themes that was not expected was that of respondents relying primarily on small groups for connected self-development. The literature of connectivism focuses

on the of massive, open, on-line courses (MOOC) with literally thousands of participants and the Army use of communities of practice such as companycommander.com and S3/XO Net, are Army-wide, again with thousands of participants. In contrast, the results of interviews and focus groups conducted for this research suggests a reliance on small groups of less than a dozen individuals connecting for learning. Lieutenant Audrey observed:

> I connected to a Lieutenant Colonel and a couple of majors a couple of years ago and get in touch with them at least once a month. I've never met them, but they always follow up my questions with calls, texts and emails to provide support.

Lieutenant Oscar stated, "There is a small group of lieutenants that meet once a month at the golf course on post. They share ideas and discuss what works and what doesn't." Major Frank explained that he "Relies on a small group of diverse thinkers." He called it a "core group" and explained that he had three or four of these groups, each of which he structured around a certain topic. Each core group was three to six persons, meeting on-line primarily through email and sharing articles and links.

Major Hal has formed a small group for learning at each of the last three locations he has been stationed. He started with a small, three-person interaction, and expanded it into a beer call for sharing ideas. He used a similar approach, minus the beer, when deployed in Afghanistan. So, even when in combat Major Hal still made the effort for connected self-development. In his most recent assignment he began each meeting with a short presentation by an expert in the topic for the night and then opened the group to discussion, to include interactions with the expert.

Captain Mel believes that "Connections are more important than content in learning." She found institutional education in the Captains Career Course impersonal with about 80 people per class. In contrast she trusts her closest friends for support with self-development, even though her interactions are largely by phone or email. Lieutenants Pete and Rob both primarily reach out to other lieutenants in their unit for their self-development. Lieutenant Rob stressed, "My company executive officer is my "go to guy" when I have something I need to learn about. He always knows who I should talk to or where I should look." Captain Tim stated, "I've connected with people on Facebook on a particular topic and then continually go back to them when I need to…there are maybe six or seven of those guys."

An off-shoot of the small group approach favored by the respondents is their belief in the role of mentors in promoting and enabling effective self-development. Captain Lou had great respect for a former commander who still kept in contact with a handful of captains that he guided in their self-development. Lieutenant Audrey says her mentor, "Is a source of creativity and inspiration." She added that mentors, "Help to make sense of a mass of information." For several years Major Doug has had a mentor who is a senior General Officer in the Army. He noted that not only did that mentor help him, but also put him in touch with several other senior officers as mentors. Most respondents sought or have mentors who are not in their chain of command. Lieutenant Ike and Captain Will both specifically stated they sought mentors outside the chain of command. Major Frank, Captain Tim and Lieutenant Neil all connected to their mentors

on line via social media. Captain John's former platoon sergeant is his "go to guy" to talk to and bounce ideas.

Value of virtual self-development relative to face-to-face

Respondents were mixed in their opinion of the relative value of virtual self-development relative to face-to-face. Captain Lou is of the opinion that both virtual and face-to-face have virtues, "We need both types of connections to learn. Sometimes we engage people on line, sometimes we meet for a 'drink and think' to share what we know." Major Frank also employs both learning venues. He connects virtually to artists and others outside the military mainstream in order to "learn things that I am fascinated with and have value to me." Lieutenant Ike stated he follows platoonleader.com, a military site similar to companycommander.com, for ideas and best practices, but also appreciates informal discussions with mentors on specific topics.

Many other respondents, particularly lieutenants, preferred virtual connectivity over face-to-face for learning and self-development. Lieutenant Charlie favors virtual connectivity, "Web enables me to connect easily. I could sit in a classroom with a thousand doors and link to others far better than I ever could face-to-face." Audrey also favored virtual connections for learning. She pointed out that even as a Lieutenant she has met lieutenant colonels and majors on line and learned with and from them, something she admits is very difficult to do face-to-face given the culture of the Army. She added that even though she was just a lieutenant, she was virtually researching and writing white papers for a colonel in the Pentagon. Major Doug stated that his PLN was the same as his virtual community of practice. Describing how he connected through

social media, he noted that companycommander.com, a virtual community of practice started by two officers serving at West Point in the late 1990s, was the start of his deliberate self-development efforts. Major Hal described the impact of virtual connectivity on his connected learning. "Twitter was when my self-development expanded. Twitter enabled me to link to other learners. That led to sharing ideas and knowledge with them by email, and then by phone, and then eventually in-person."

In the captains' focus group, Tim pointed out, "If you want to learn from non-military people you almost have to use social media. We live and work on-post. We have almost no way to link-up with people in the outside world." In the same focus group Captain Steve supported that position, noting, "I spend a lot of time on Facebook and Linked-In…maybe too much time. But, that is the only way I can connect to people who are interested in things I am interested in." When interviewed, Captain Young suggested that virtual learning and connecting via the internet were critical "I reconnect with old classmates and share articles on ethics and senior leaders with the Army. This led to an OPD on sharing what we know.""

Some respondents still favor the more traditional face-to-face learning over virtual for their self-development. Already noted were the lieutenants who meet monthly at the golf course and the monthly informal topical gatherings to learn. Lieutenant Ed stated, "my self-development is founded in reading and then seeking out mentors, talking to them and building relations. Several respondents, including Lieutenants Neil, Pete and Rob in the focus group, suggested that older officers resist social media and only think learning is occurring if they read it or it is taught in a formal professional development

class. Lieutenant John stated, “In the limited time I have been in the Army my best [self-development] experience has been informal discussions among three LTs (lieutenants) who are waiting for jobs.” Captain Victor described in detail his leader development program for his lieutenants, which was face-to-face and included reading, writing and hands-on technical learning. For her PLN, Lieutenant Mel observed that she “likes to talk to people before using the internet.” When confronted with a topic she has to learn about, she asks peers or the first sergeant and then goes to superiors and asks them. She added, “I don’t use social media for learning.”

Desired Characteristics for Self-Development Solutions

In terms of the characteristics of a self-development approach for officers in the U.S. Army the results address both the environment and the methodology of learning. This dissertation posited that PLNs form the environment in which self-development occurs. What the evidence from the 22 respondents suggests is that in developing their PLN, people use what they use everyday. Despite the myriad of military sites that are available, when asked, the officers described a PLN built around their preferred environment for learning. In most cases that environment was either based on social media, or books. In terms of methodology, although mostly unaware of connectivism as an emerging theoretical approach to learning, virtually every respondent described a variation of connected learning that included connecting to other learners, curating information, creating new knowledge and sharing that knowledge. Analysis of the desired self-development approach, described by the respondents and accounting for their desired environment and methodology, resulted in the following six characteristics emerging:

relevant, tailorable, available, scalable, exportable and portable. These six desired characteristics are depicted in Figure 6 below.

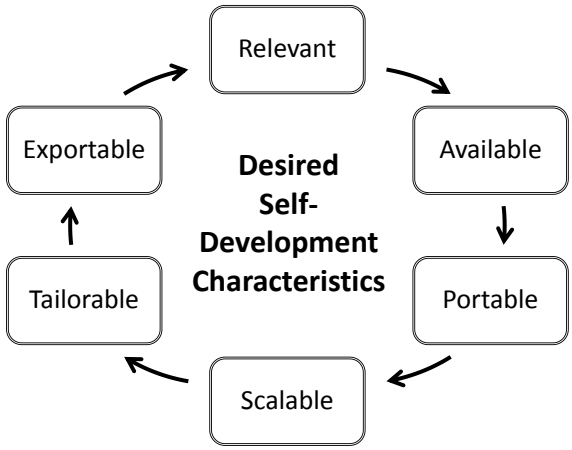

Figure 6. Desired characteristics of self-development solutions.

Relevant

Many officers believed strongly that self-development had to be relevant to them. They acknowledged that the Army has organizational leader development programs, primarily consisting of lectures and practical exercises, but stressed that self-development had to be relevant to what they wanted to learn, not what the institution wants them to learn. Lieutenant Ed was direct, "Self is the most important word in self-development. It has to be of interest to you or you won't do it." Captain Victor stated, "Leader development has to be different for each of us. It can't be 'one size fits all'." Major Doug stressed this when he stated, "The Chief of Staff of the Army (CSA) reading list is archaic." He went on to say, "My self-development has to be relevant to where I am in my career." Captain Lou stated, "My self-development has to relevant to me. It has to overcome the gaps in knowledge of mission and region and has to overcome institutional

deficiencies." Captain John observed, "Leader development in our unit is mostly formal. We have an LPD every week. The commander chooses the topic. Sometimes it's something I want to learn about, sometimes not." Lieutenant Ike had the same opinion of formal prescribed LPDs as Captain John. Captain Steve remarked:

> Most of these guys are infantry or armor. I'm not. The classes the unit commander picks are relevant to them, but most of them don't help me at all. Some of the classes are universal, like counseling or supply discipline, but most of them aren't.

Several respondents described their self-development approach as shaped by what they wanted to learn. Major Hal observed, "My self-development is driven by my own interests, which are history, theory and biography." Lieutenant George wanted self-development opportunities that were going to help him in his current position. He noted, "My self-development interests are much more job-oriented than profession oriented." Lieutenant Rob was also focused on learning that would help him in this assignment, "Right now, I want to learn more about tank and Bradley gunnery. I don't need another class on wheeled vehicle maintenance." In contrast, Lieutenant Audrey shaped her self-development around preparing for her next assignment, "I'm personally working on my Masters, taking classes to make up for short periods in each job. I think it's important to tweak what you know and prepare for the next job." Lieutenant Pete stated, "Outside LPDs, I like to read military history." Major Becky described her self-development focus, "After my first job in the Army and the Captains Career Course I realized I needed to know more about leadership. I began to study on my own."

Tailorable

Respondents wanted the ability to tailor the execution of self-development to themselves in terms of their learning styles, interests, and schedules. Next to relevance, tailorability was the characteristic most described by the respondents. Lieutenant Charlie pointed out:

> In the military people look at self-development from their own perspective. So, the superior says 'read this book and write a report.' And everyone complies, but what they are really thinking is, 'I want to engage with the topic my way'

In describing her use of social media, Lieutenant Audrey expressed her ideas on tailoring. She described that she most often used Facebook because it was more responsive and more widely used than the military communities on the Army networks. She added that through Facebook she could get articles, not just sites. In addressing the three options used to share knowledge in the self-development case (Padlet, Twitter and email) she stated, "I don't want to use Twitter. Twitter is about feelings. I don't want feelings; I want facts." She added, "I use YouTube when I want to know how, rather than why." Major Becky described how widely she has tailored her PLN:

> I read leadership books, I read blogs on leadership, I physically attend conferences, I watch videos and TED talks. I don't use Facebook because it takes too much time, but I do stay connected with a few learners I met at the conferences. Periodically I take individual courses to maintain my certifications.

Major Doug was of the opinion that tailorability was the most important characteristic of self-development. He suggested, "There is tons of stuff out there. You

have to be able to tailor it to your interests. I don't like to be told what to read and I want to make the best use of my time." Regarding his approach Major Doug stated, "My self-development approach is through reading, writing and reflection. I reflect on my reading in a notebook and write via a blog to compare my reflections with my experiences. To me reading books is more important than internet technologies." He went on to describe his PLN, "My community of practice is my PLN. They are the same. I stay connected through social media. Much of my network is outside the military."

Major Frank stated, "I want to color outside the lines." He then described his self-development approach, "I am looking for continuous stimulation for learning and discourse. I want the freedom to disagree." To support that approach Major Frank described his PLN as a "loosely coupled group of strategic leaders and thinkers who emerged as like-minded learners and joined together."

Like many others in the case, Lieutenant George used a variety of social media to connect to other learners, gather new information and share what he had learned. One of the points he made was, "Social media enables me to gather a variety of perspectives, including foreign perspectives such as the British, or even Al Jazeera." Regarding his use of social media in support of learning he observed, "From a learning standpoint I am probably on social media one and a half to two hours [a day]. I'm definitely on the extreme to one side." He described his use of Facebook:

> On Facebook everyone wants to have their voice as far as what they believe in. I went to the Military Academy and a lot of my friends are on Facebook, so even when deployed I can stay connected to learners more readily.

Lieutenant George went on to point out that on Facebook the personal can transition to the professional and he could connect to unit commanders and lieutenant colonels on Facebook, so rank wasn't as important as in face-to-face discussions. He then described the value of Twitter to his learning in that he could follow whoever he wanted and filter out what he didn't want. Additionally, Twitter enabled him to learn from a range of sources, including news media, government agencies such as the State Department, or universities.

Major Hal tries to balance social media, books and blogs. He writes considerably and considers it his responsibility to share what he has learned. A prolific writer, he writes an on-line blog and has published in numerous on-line and traditional journals, including: Small Wars Journal, Infinity Journal, Journal of Military Operations, Parameters, Military Review and Armor. Most of his PLN connections are through social media, "I use Facebook for keeping connected to other people. I use the forum on Facebook for learning and sharing ideas. I belong to several forums and run a few myself." Other social media he used for learning include: Instagram, Medium, Goodreads, Twitter and Slack.

Lieutenant Ike tailors his learning approach based on what he is trying to accomplish. For daily work focused on his current job in the Army he:

> Watch the other platoons and companies to see what works for them, then talk to the other guys, see the problems that they have and that you have and someone almost always has gone through the same thing that you have and they have a different perspective.

For broader learning he relies primarily on outside sources, but in a more traditional mode. Lieutenant Ike reads for current affairs, but traditional newspapers, not on-line. He enjoyed the connected learning self-development case, but again prefers the more traditional approaches:

> It wasn't my favorite way of doing things. I would have preferred to have taken more time and written in-depth papers and then discussed them. But, Padlet was a good substitute because in a setting like that where you have done research and written your idea everyone else has done research and can come in and post their idea, so you get to see the different perspectives and that is the benefit of social media. There is a huge benefit when it is a short piece and a short timeline.

Lieutenant Ike went on to propose a use of Padlet for guided self-development. He suggested an approach in which each week each lieutenant was required to post a critical issue or idea on Padlet. This would enable them to share ideas and experiences across the unit and develop relationships of shared interests. It would also enable them to be exposed to different perspectives and practices.

Not every officer was as deliberate about self-development as Lieutenant Ike. In contrast Lieutenant Neil acknowledged a haphazard approach to self-development:

> I'm not as focused about self-development as I should be. I think of a subject that I'm interested in and then I binge on learning about it. I like the ability to learn about different subjects in different ways depending on the subject.

Lieutenant Neil observed he might read a book about a topic, or Google the topic to see what he might learn. He primarily used Facebook for personal purposes, but did sometimes use groups to learn about a particular subject, usually for his current position.

Lieutenant Oscar used a very 21st Century, web-enabled approach to tailoring his learning, "When I'm trying to learn something new I usually Google it first. Then I see what comes up and follow that to learn about the subject. I like to watch YouTube videos about a new subject if I can." In the focus group Lieutenant Pete reinforced Lieutenant Oscar's approach, "I do the same thing, although usually I am looking for an article or a book to read."

Captain Tim enthusiastically described his approach to structuring his PLN and learning, "I spend a lot of time on Facebook and Linked-In in Groups. You can find a group about almost anything, you just have to find a good one.' In response to the question as to what constitutes a good group he replied:

> One in which you can get into a discussion that isn't just opinions about stuff, but has facts and people sharing ideas. And people need to read what you write and answer it, not just go off on their own tangent.

Captain Tim observed that he often watched videos on YouTube, usually to learn how to do something, but he also watched TED Talks to hear new ideas. He had been on Twitter, but found it too time consuming to track the many people he was following, "It took too long to read through the garbage to get to the good ones."

Captain Young stated that he didn't use social media that much, in part because of security reasons. He did participate in a community of practice of selected captains, with

whom he shared ideas and collaborated to write papers. He also learned much from connecting to the on-line library for his Masters program. Captain Young was one of the few who used email to share his idea, while most used one of the Padlets.

Available

One of the major differences respondents described between self-development and institutional schools or unit professional development programs was availability. Officers described institutional and unit programs as being on the schedule and topic of others, not themselves. The analysis is, respondents wanted self-development to be available when, what and how they wanted to learn. Captain Mel stated clearly, "I'm not waiting for the Army to provide for me when the time is right. I'm going to go out and seek what I need to learn."

Captain John was concerned with tailoring the ability to share to different audiences. He stated, "You come up with a lot of opinions, but you kind of keep them with you. If there was an outlet to share ideas that would help a lot. On-line would be good, like the one we posted to [Padlet during the self-development case]." He acknowledged that, unlike many others, he primarily used social media for entertainment rather than learning.

Lieutenants in the Army are new to the organization and have much to learn. They are taught to ask their Non-Commissioned Officers (NCO) first if they have a question, and then their peers and chain of command if they still need answers. But, increasingly lieutenants are placed in positions in which they have to go to new sources of learning. Lieutenant Ike pointed out, "when we were in Iraq we weren't really in a

company. We were operating in these [ad hoc] advise, assist, enable teams. So, we didn't have a lot of NCOs to turn to." Other lieutenants had similar experiences. Lieutenant Neil stated, "Even in Iraq I had access to the internet. I could get on-line and find someone who had the answer to my question." Similarly, Lieutenant Charlie observed:

> I just handed off this project when I went to [name of his current unit] and the TACSOP [tactical standard operating procedures] was very old. So, I went to the Platoon Facebook Group and contacted several of my buddies I knew were in heavy units and got info from them. Normally I would go to the NCOs in my unit, but I wasn't there yet.

In the focus group, Captain Tim explained, "Facebook is always out there. Twitter is always available. I can Google anything at any time. I don't want to wait and I don't have to." Captain Victor added to the availability discussion, focusing on the lack of control he had over the learning, "We are too dependent on training areas and ranges for our training. My lieutenants need to be able to learn on their schedule and on my schedule, not on the Division training calendar." Captain Will suggested the main advantage of social media, books and email had was that they were available at night and on weekends, not just during the standard work day.

Lieutenant Rob described his frustration with the NIPR system used on the computers owned by the Army and used during daily work in the unit, "I can't get to sites that I want to while at work. I understand blocking sites for security or porn, but I use social media to get information, not just to [fool] around." Lieutenants Neil, Oscar and Pete all nodded and agreed with Rob's position.

Scalable

Respondents desired a self-development capability that could be scaled to their learning objectives and effort. Additionally, many respondents described an ebb and flow of self-development effort, based on their work load and specific job position. In contrast, most felt they had no control over the magnitude of effort and learning objectives of unit leader development programs.

Major Doug suggested, "The culture of self-development has to change so that people can take advantage of it." He added that the best idea for a self-study program was to put it on social media, so that individuals could do as much or as little as they wanted. He cited the example of the 20 topic areas for self-study in the Maneuver Leaders Self-Study Program sponsored by the Maneuver Center of Excellence at Fort Benning and available on Linked-In, "You can study strategy and politics for a while, then jump over to military leadership."

Captain John described a semi-structured approach to leader development in which the Unit Commander designated a person to lead a weekly class, but then each officer could select, develop and teach the topic however they wanted. He selected the topic of combined arms breaching [moving through an obstacle such as a minefield] and described his preparation as follows:

> I pretty much had to go back into the manual and refresh myself. Then I Googled it and found an article from the Corps of Engineers Magazine and I used that as another reference, another resource for my brief…it was half on the basics of combined arms breaching and half on tips from effective units.

Lieutenant Ike was aware of the importance of using his time wisely and wanted self-development activities to be efficient, "Why have the entire Army inventing the same thing over and over again when you can go on-line and learn it in 15 minutes instead of 2 hours." Similarly, Captain Young pointed out, "Seems like I am always trying to catch up…I'm in command, working on a Masters, and have a 2-year old…when I need to learn something its easy just to jump on-line, find it and move on."

Several respondents described a desire to be able to go deeply into the study of a subject. Majors Frank and Hal both described extensive reading programs, primarily in books, but also including social media sites, such as Small Wars Journal they both follow, to explore topics of interest. Lieutenant Pete and Major Becky both described leadership as the main focus of their self-development and both employed a wide-range of sources including books, social media, videos and face-to-face interactions. Captain Will stated:

> I had a lot of free time in Korea and I got really interested in the Korean War. We had a lot of books on that in the library, as you would expect on a base in Korea. And I looked on-line too.

Captain Young suggested, "Self-development has to be scalable to all ranks. It has to be meaningful to everyone."

Portable

Interviewees suggested that too often leader development in the Army is tied to the classroom. They wanted to be able to learn anywhere and to be able to take their learning resources with them, whether they were in school, on base, in training or

deployed overseas. Respondents suggested it was the internet and smart devices such as phones and tablets that gave them that capability, not formal army programs. Lieutenant Oscar stated, “I love my iPhone. I can think of something I want to know and just Google it no matter where I am and just start learning about it [the topic].” Lieutenant Neil added to that statement, “I can Google something in the motor pool and then keep reading about it while I am walking back to the company area.”

Regarding devices, every respondent had a smart phone and several reported having smart tablets. They contrasted these with the fixed computers the Army used in their offices. Captain Steve observed, “If I was in the DFAC [dining facility] and I didn’t have my phone if I wanted to look something up I would have to go all the way back to the company.” Captain Tim remarked:

> One of the things I hate about going to the field is that we don’t have much cell phone coverage. And, CPOF [the computer system used during field training and when deployed to combat] is so limited that if I want to know something I have to wait until we get back to main post, and by then I’ve forgotten what it was.

Already frustrated by the NIPR limitations in her office, Lieutenant Audrey said, “Leaders have to see everything and we can’t. We have to bring in a personal laptop [to work]; my laptop is always with me and I have my personal hotspot on my iPhone.” Captain Mel worked in a classified facility and also expressed her frustration at being cut off from sources of learning when at work.

Exportable

Analysis of the respondents' comments revealed the desire for learning for self-development to be exportable in two ways. The first way was from the institution, such as a professional military education school, to service in an operational unit. That means they didn't want their self-development interrupted by the moves they often had to make every two or here years from one location to the other. The other application of exportability was the ability to export, or share, what they had learned with someone else.

In one of the few references to the National Guard or Army Reserve in this study, Captain Lou explained his rationale for why self-development had to be exportable, "Our mission is to create citizen soldiers who are productive even in their civilian lives." He went on to suggest that all the steps in the connectivist approach employed in the case were part of his personal approach to self-development, but it had to be exportable to the next assignment. He gave an example of moving to a new Fort for a new assignment and being assigned the Pacific Region as an area of learning interest. Captain Kelly also wanted to address the problem of continuing learning when moving from one assignment to another, "I learned a lot in the Captains Career Course, but when I got to [her new post] I had to start over."

Major Hal described the most extensive exporting of learning and new knowledge reported in this study, using a combination of publishing in journals, postings on the internet, and face-to-face get discussions. Lieutenants Ike, George and Charlie all thought the use of Padlet to share learning was effective in the case. Lieutenant Charlie noted:

> Padlet was good for being able to view information and having responses grouped together, but it is disjointed…What was cool about it was that you could grab ideas from anywhere and share them, but the interface was not smooth.

He added that Blackboard used in the Army's institutional learning was the nearest thing he had seen in the military.

The six themes that emerged from the analysis of the data collected through the interviews and focus groups directly inform the three research questions in this study. Additionally, the six characteristics of a self-development solution derived from the respondents also inform the findings related to the research questions. Below is the second major section of the results of the analysis, which uses the themes, characteristics and data to derive the findings of this study related to the research questions.

Findings on the Research Questions

In this section the results of the data analysis are expressed as findings related to each of the three research questions. The findings for each question are supported by the themes developed above and the data and analysis that support each of those themes. Additional data and analysis are presented to support the findings as appropriate. Data and quotes previously presented are referred to, but are not verbatim repeated. The discussion of the findings for each research question will also include suggestions that may help the Army in adapting its current self-development practices in the direction of a more effective and learner-centric long-term self-development solution.

Research Question 1

What are the implications of adopting PLNs as the self-development learning environment in the Army?

Analysis of the data collected from the 22 respondents and the derivation of the themes that emerge from that analysis suggest three implications for the adoption of PLN as the self-development environment in the Army. Those three implications also correspond to three of the six desired characteristics of self-development solutions theme. The first of these implications is that PLN are effectively already the environment of choice of the respondents. This first implication corresponds to the "available" desired characteristic of self-development solutions. The second of these implications is that Army leaders are using open networks and small communities of practice as sources for their PLN, rather than the closed networks and large communities of practice currently in use by the Army. This second implication corresponds to the "scalable" characteristic of self-development solutions. The third implication is that self-development must be a more robust component of Army leader development and more tightly coupled to institutional and organizational learning. This third implication corresponds to the "portable" characteristic of self-development solutions.

The first implication is that PLN are effectively already the environment of choice of the respondents for their self-development within the Army. The current Army developed communities of practice for use in self-development are institutionally driven as opposed to individually developed or learner centric. Examples such as companycommander.com and S3/XO Net, were considered by the respondents to be out of date and difficult to use. This is supported by the sources of learning reported by the

participants in this study. During interviews and focus groups each respondent was asked which Army, Web 2.0 and traditional sources they used when curating information for their self-development. The results suggest that the least used sources are the Army sites that are resident on Army Knowledge On-line (AKO) or developed separately such as the Center for Army Lessons Learned (CALL) website. The results of this sample population also illustrate the generational movement away from official Army sites. All four of the majors, members of Generation X, who participated in the study use the Army sites as sources of knowledge along with other sources they described in interviews. In contrast, only three of the eighteen captains and lieutenants, all of whom are members of the Millennials or Net Generation (Skiba & Barton, 2006), use the Army sites.

Table 2 documents which sources of learning are employed by the respondents.

Table 2

Sources of Learning Employed by Participants

Name	Facebook And/or Linked-In	On-line Journals	Twitter	YouTube And/or Podcasts	Blogs	AKO & CALL	Analog And/or Reading	Face to Face
Audrey	X	X	X	X				X
Becky		X		X	X	X	X	X
Charlie	X	X	X	X			X	X
Doug	X	X	X	X	X	X	X	X
Ed	X		X				X	X
Frank		X			X	X	X	X
George	X	X		X	X		X	X
Hal	X	X	X	X	X	X	X	X
Ike		X				X	X	X
John		X					X	X
Kelly	X		X	X				X
Lou	X			X			X	X
Mel							X	X
Young			X		X			X
Neil	X	X	X	X	X		X	X
Oscar				X				X
Pete	X	X		X			X	X
Rob	X	X		X				X
Steve	X					X	X	X
Tim	X	X		X	X			X
Victor	X			X		X	X	X
Will	X		X	X				X

Analysis suggests Army leaders are employing Web 2.0 technologies and social media for their PLN, yet doing so in a variety of ways. The variety in approaches to structuring PLN is affected in part by the interests and learning style of the individual, but also in part by the lack of any Army direction, guidance or education in self-

development. This implication suggests that the Army ought to expand its doctrine for self-development, to include the guidance and recommendations for developing and employing PLN, in Army Doctrinal Reference Publication 7.0 (ADRP 7.0), Training and Leader Development and the Army Learning Concept.

This first implication corresponds to the self-development solution characteristic of available because one of the major desired characteristics expressed by the respondents was that their learning sources be available when, what and how they need them. Their experience with AKO and Army sponsored sites is that those sources are not available because of the limitations of using the official NIPR networks and because of software limitations. This suggests that the Army ought to make commercial internet more available in Army offices and work areas and ensure greater WiFi or satellite connectivity across all its bases and training areas. It also suggests that Army education, training and other organizations ought to make their products and information readily accessible via social media sites, such as Facebook, Twitter or blogs, rather than official sites that are rarely used and resource intensive to develop and maintain. An example of this suggestion as reported by Major Doug and Captain Lou is the Maneuver Leaders Self-Study program that is hosted on Linked-In. As a recommendation, information producing sites such as CALL, Army Research Institute (ARI), and the Foreign Military Studies Office (FMSO) could sponsor groups on Facebook or Linked-In and post their products on Twitter, thus potentially reaching more learners and having a greater impact Army leaders learning, understanding, problem solving and decision making.

The second implication is that Army leaders are using open networks and small communities of practice as sources for their PLN, rather than the closed networks and large communities of practice currently established by the Army. At least once during the interviews and focus groups of all 22 respondents reference was made to their reliance on and the power of small groups for learning. Not a single respondent advocated large communities of practice or the types of massive open on-line courses that include thousands of students favored by the connectivists. Lieutenants Ed, Kelly, Pete and Rob; Captains Mel, Steve, Tim, Victor and Young; and Majors Becky, Doug, Frank and Hal all suggested that they trusted a small group of people when engaged in self-development, even when in some cases they connected with those others on-line and have never met them personally. Lieutenant Audrey observed, "I exchange Facebook post, phone calls and text messages and we have formed a bond…and I have never even met them face-to-face, but they willingly extend that friendship." Even within the self-development case, the on-line discussions were small. For example, Lieutenants Charlie and Ike, Captain John and Major Becky shared what they had learned about leader development on a Padlet on the subject of leader development. Lieutenant Neil remarked, "I tried to find some information on the CALL website, but it was just too hard." Similarly, Lieutenant Oscar stated:

> When I was made the company supply officer I went onto AKO to try and learn about supply operations. I spent hours and couldn't find anything worthwhile. There were too many AKO sites and navigating them to find what I was looking for just took too long.

Much of the learning reported by respondents was through connections to other military personnel, whether face-to-face or through virtual connectivity. All 22 respondents reported face-to-face connections to other learners or mentors as contributing to their self-development. Still, many of the officers rely heavily on sources of learning that are outside the military and can only be reached through open networks and social media, not through the closed NIPR networks and restricted Army sites. Captain Young connected to outside sources during the self-development case on-line or face-to-face, "I joined an Army group for leader development and got into discussions with several students and civilians about leadership. They had a very different perspective, very interesting." Captain Tim stated, "The military blogs can only be reached through a .mil address [the military email addresses] or with special permission. That means we don't get the opinions of academics or regular people. We have to go outside the military for that."

What this implication suggests for the Army is that rather than Army-wide and Army-only communities of practice, self-development environments and methodologies ought to move in the direction of a more scalable approach. Scalable is the desired self-development characteristic that emerged from the respondents input that addresses the mismatch between the small, open communities of practice desired by the respondents and the large, closed communities of practice currently in use by the Army.

What scalable might look like for future Army self-development would be an environment in which leaders could link their individual PLN together for a group purpose that is scaled to the group and what they desire to learn about, rather than an

AKO site that can not be scaled. This is what occurred in the self-development case with the unit. The officers were oriented on leadership and connected internally and externally to form sub-groups on topics of interest. Some officers, such as Lieutenant Oscar, learned individually, seeking out articles and information on the internet, then sharing what he had learned with the others in the self-development case.

The third implication in answering the first research question is that self-development must be a more robust component of Army leader development and more tightly coupled to institutional and organizational learning. The respondents' belief that the Army values self-development less than the other two doctrinal leader development domains of institutional and organizational was documented in addressing the first theme above, that of lack of Army support for leader development. Lieutenant Audrey observed that she employed self-development to cover gaps in institutional and organizational learning:

> Through my own self-development I learned how to present information in a way people will understand…how to think like a maneuver guy. [As a combat service support officer] I learned about tank tables on line. Through connections I learned how each [branch] fights and thinks…artillery, then cavalry, then brigades.

She went on to tie together self-development and organizational learning, "We have to integrate hands-on, experiential, unit learning with connected learning via the internet. That's self-development integrated with unit learning."

Major Becky used the distance learning component of the Army's formal, institutional Intermediate Level Education (ILE) for her own self-development. ILE is a

mandatory course for all majors in the Army, but the resident, face-to-face course conducted at Fort Leavenworth and satellite campuses has a different curriculum than the distance learning version for those who can't attend resident instruction. She observed:

> My husband and I are both in the military, so we don't have a lot of time for travel to schools. So, I have taken the distance learning ILE and it has been very worthwhile. It matches what I am learning in the unit about the brigade combat team and MDMP [military decision making process]. Some of the readings are very good with videos; other readings drive me to outside sources.

Lieutenant Charlie stressed the complimentary nature of institutional education and self-development, "The Infantry Basic Officers Leadership Course taught me doctrine, but out in the unit execution was different. My self-development covered the gray area between formal and informal education." He went on to describe the linkage between unit organizational leader development and individual self-development, "Our unit did a staff ride to the Battle of Solomon's Fork. It was very good. We read a book and talked about tactics and history and leadership. Afterwards I followed up with internet learning about the Plains Indians."

Major Hal took a different approach. In his opinion self-development ought to be preparation for formal, institutional professional military education, "When I became a strategist I studied strategy on my own. This turned out to be preparation for my formal Basic Strategic Arts Program." In contrast, Captain Young used self-development to advance his learning beyond his formal, institutional education, "I left the Captains Career Course and came back from deployment and realized I need to better myself. So, I

studied on my own, mostly reading and surfing the internet to find answers, then started a Masters Degree program."

This third implication of the requirement for more robust and integrated self-development is linked to the third desired characteristic of a self-development solution, that of self-development being portable. The ability for the individual to link together the institutional, organizational and self-development domains of learning relies on portability. Institutional and organizational education are relatively fixed in terms of when, where and what. For example, captains attend the Captains Career Course in their 4^{th} or 5^{th} year of service. They then go to an Army unit and participate in organizational leader development, as most respondents pointed out usually scheduled, formal classes. They also deploy overseas to contingency operations where they are largely separated from both institutional and organizational leader development. The respondents noted the ability to use their PLN to connect and learn no matter where they were. Captain Will stated, "In both Korea and Kuwait I used the internet when I needed to learn something. I used Facebook to connect to guys who knew more than I did, or I just looked things up."

What this third implication suggests for the Army is that capability for self-development to fill in the gaps and connect the learning between the institutional and organizational domains ought to be recognized and leveraged to improve leader development. Recognizing that each Army rank and branch has certain knowledge, skills and attributes that the officer must demonstrate, the development of those officer characteristics could be mapped out across institutional, organizational and self-development learning. This would both strengthen and better define the role of self-

development in the overall leader development strategy. This would also take advantage of the portability of self-development, by enabling each individual to map out for themselves a "learning continuum" that spans institutional, organizational and self-development. Such a learning continuum would be in part defined by the knowledge, skills and attributes the Army desires to be developed in every officer and in part by the individual learning desires and styles of each officer.

Research Question 2

In what ways does a connectivist approach improve self-development in Army units?

Analysis of the data collected from the respondents suggests three major implications for the Army from the use of the connectivist approach, both in the self-development case and more generally across the Army. These three implications also correspond to the other three of the six desired characteristics of a self-development solution. The first of these three implications is that Army leaders desire a "student-centric" methodology for self-development. This first implication corresponds to the "relevant" desired characteristic of self-development solutions. The second implication is that Army leaders already informally employ variations of connectivism for their learning to fill gaps in formal leader development programs. This second implication corresponds to the "tailorable" desired characteristic of self-development solutions. The third implication is that Army leaders connect not just to learn, but also to share their learning with others. This third implication corresponds to the "exportable" desired characteristic of self-development solutions.

The first implication is that Army leaders desire a "student-centric" methodology for self-development. This implication relates to the four principles of connectivism: autonomy, connectedness, diversity and openness. On autonomy, Major Doug stated, "I ask myself a question, then use my network to connect to specific learners to tap into their PLN." Lieutenant Ed observed, "The Army doesn't know what the individual is interested in, what the individual wants to learn. I routinely connect with a network or connect to experts in order to learn what I want to learn." Major Frank was more critical:

> The military approach is a 19th Century factory-based model. We categorize by age, specialty, schooling and move forward as groups…this leads to a stifling of creativity…we have to be able to explore our learning from our own self-development lens.

In terms of connectedness every respondent addressed the virtues of connected learning. Regarding the self-development case Lieutenant Rob stated, "I connected to the other officers for learning in ways I had not used before." Captain Victor said of the connected approach, "I had connected often to others for learning, whether inside or outside the Army. What I liked about the Padlet was that I could see the connection of ideas on a single screen."

Diversity also was a principle of connectivism that was in evidence in the respondents' comments. Respondents noted in particular that the diversity in connected self-development provided the individual-centric learning that was not provided by institutional education or organizational OPD. Lieutenant Neil stated, "In OPD we are expected to learn the party line. That's OK for learning doctrine or counseling, but we

need options when we are talking tactics." Lieutenant Oscar reinforced that thought in the discussion, "The great generals and heroes we read about were great because they did things different. They took risks. We need a way to learn about different ways to do things." Lieutenant Pete added:

> Talent management is hot right now. Everyone is talking about it, but no one seems to have any real ideas. Especially not the chain of command. So, I go outside to learn about talent management, mostly from reading about business.

From these comments, as well as those captured in the themes above it is apparent that respondents see connected self-development as a source of diverse ideas and approaches they can't get in formal organizational or institutional education.

The fourth principle of connectivism that supports the implication of Army leaders desiring student-centric approaches is that of openness. Openness refers to the ability to employ open networks to connect when, where and with whom desired in order to learn and not be constrained by institutional or organizational limitations. Captain Mel stated:

> I took a civilian course in leadership for my own self-development. It was an experiential course sponsored by a private organization. After a number of Army courses and organizational leader development in Army units, the civilian perspective affected my thinking more than any other course in PME [professional military education]. It caused me to examine the way I think and learn.

Captain Lou pointed out the connectivist approach enabled him to build a repository of sources. Captain John stated, “The case study was interesting. It led to other articles, which led to discussions with other companies, which led to connecting outside the unit.” Lieutenant Ike observed, “I share email groups with like learners outside my unit. I really don’t spend much time on social media, but email let’s me stay connected and share ideas.”

Gaining different perspectives through openness was important to many of the respondents. Major Doug stated, “I linked up with members of the Australian Defense Forces. They are really smart and thought of things that I hadn’t.” Major Hal’s evening social get togethers for learning enticed individuals from a wide variety of organizations and disciplines to come together to discuss a specific topic. Captain Steve connects with others via Facebook:

> I haven’t really used social media that much for learning, but when I have I’ve always gotten really good advice from great guys. They’ve suggested readings or doctrine I wouldn’t have found on my own or talking to the guys in my company.

Lieutenant Charlie suggested the impact of connecting with learners with diverse perspectives, “I watch a lot of YouTube and TED talks and use Reddit to get news and opinions. You don’t really see that you are changing how you perceive things.”

The application of the four principles of autonomy, connectedness, diversity and openness in support of a student-centric approach to self-development corresponds to the “relevant” desired characteristic of self-development solutions. Respondents desired connections and content relevant to what they felt they needed to learn, in addition to

what the institution or organization demanded they learn. Lieutenant Pete stated, "I learned a lot in the basic course, but when I got to my first unit there was so much I didn't know. I was the only one who knew what I knew and what I didn't." Lieutenant George observed:

> My approach revolves around literature and social media that is about what I am interested in learning. Right now that is training and equipping foreign militaries. So, I read blogs and follow guys on Twitter and read *Small Wars Journal* and *War on the Rocks.*

The Army Learning Concept for 2015 (U.S. Army, 2011) describes the requirement for Army education to be learner-centric. This implication reinforces that direction and suggests that Army leader self-development doctrine ought to be more specific about ways in which leaders can connect with a diverse set of fellow learners and sources of information in order to accomplish the learning objectives that they each define.

The second implication in answering the connectivism research question is that Army leaders already informally employ variations of connectivism for their learning to fill gaps in formal leader development programs. Throughout the self-development case officers connected, then curated, or found information, artifacts and other sources of learning, then created new artifacts or new ideas, and then shared what they had learned with others through the Padlets or email. Lieutenant Ike described how he employed the self-development case to explore the officer promotion system, connecting to other officers in the group, finding and sharing information. Lieutenant Oscar described a

similar approach in his exploration of deception during the self-development case. But, officers were employing the connectivist approach before the self-development case and outside their immediate unit. Major Doug and Major Hal described how they employ a research, connect, share approach with virtual counterparts in their communities of practice, while Major Becky described how she connected with others in her specialty, set up a small community of practice that included a lending library on leadership and shared what she learned about leadership with that group. Captain Tim reported that he had taken two open, on-line courses, "I have to admit I didn't finish the first one [open, on-line course], but the second one on systems was really good."

This informal use of the connectivist methodology by Army leaders corresponds to the "tailorable' desired characteristic of self-development solutions. Captain Mel stated, "The Army is more successful if self-development is tailorable. The ability to study what we want and with whom we want will cause us all to put more effort into our education." Lieutenant Pete observed, "When we started the self-development project it was like a blank page, we could write on it whatever we wanted."

This implication suggests that the Army ought to set conditions for employing a connectivist methodology for self-development. That can begin by adapting existing distance learning (DL) courses into a connectivist format. The Army currently operates three sets of DL courses, two of which are directed institutional efforts for courses that Soldiers and leaders can not attend in person and for and mandatory training. The third is termed "structured self-development," which is individual development in which the

content, delivery and assessment are still directed centrally by the institution, in this case TRADOC.

The Army does have an initiative that begins to address the connectivist approach and tailorability that leaders in the case study indicated they employed and desired. The latest version of the Army Learning Management System (ALMS) introduced an innovation called the Army Distributed Online Collaborative Course, or ARDOCC (U.S. Army, 2015):

> This innovation uses small content chunks, video, social learning, facilitation, and mentoring in a manner similar to massive open online courses (MOOCs). ARDOCC courses are designed for open access and maximum flexibility, with easy reach-back to training content. In addition to traditional course materials such as multimedia, readings, and problem sets, real-time user forums support community interactions between learners, instructors, and subject matter experts.

What this research suggests is that the Army ought to expand the ARDOCC connectivist approach to its full catalogue of DL courses. Secondly, the Army ought to consider structuring an on-line capability for individuals and units to develop and employ their own ARDOCC courses, either for individual self-development or for semi-structured leader development in units. A drawback of the current ARDOCC approach that ought to be addressed is that such courses still operate within the closed Army ".mil" system, so that learners can not connect to outside sources of learning.

The third implication for the use of connectivist approach to improve self-development in Army units is that Army leaders connect not just to learn, but also to

share their learning with others. The current Army system that primarily employs a periodic leader development class approach is one-way down to the officer. What the analysis of the data from interviews and focus groups in this study suggests is that officers desire self-development that goes both ways up and down the chain of command, laterally to peers, and externally to other learners.

Lieutenant Audrey studied the use of contractors in support of the Army because of her own interest, but then felt compelled to share what she learned with others, "I wrote a blog in essay format, then embedded a clip in a YouTube from former service members, and then posted to a wall in Facebook." Major Doug stated, "I believe that self-development should benefit both the subordinate and the leader…Right now I use Facebook groups to share what I learn with others." Lieutenant Ed suggested, "Self-development is not just about knowledge creation, it's also about posing questions to others that causes them to think and learn." Captain John observed, "Padlet was a good way to share ideas."

Respondents were intrinsically motivated to share what they had learned. Lieutenant George stated simply, "The burden you have is to share the knowledge you have gained." Major Hal observed, "My motivation for sharing what I learn with others came from the right leadership and my own personal interest in learning…not everyone has that motivation, mentorship is key." Captain Lou described his sharing of what he learned, "I speak at philanthropic organizations, like the Rotary Club…I share ideas on social media like Facebook…I don't blog. I like to apply theory in journals like Military review. I like the rigor of the review process." Lieutenant Kelly said, "When I can I

contribute on Facebook. If I see someone has a question and I know they answer I get it to them."

The concept that leaders connect not just to learn, but to share, corresponds to the "exportable" desired characteristic of self-development solutions. This suggests that Army self-development must be more open in order to enable leaders to connect to and share what they have learned with others. If the respondents connect to and share their learning with other Army learners primarily through Facebook, YouTube and on-line journals, then the Army official primary environment for self-development ought to be social media rather than the restricted and limited connections available through current Army official sites. This suggests also that the Army Training Support Command's (ATSC) role should transform from generators and distributers of content (U.S. Army 2014) to enablers of connected learning and sharing.

Research Question 3

How can the use of PLNs and connectivism contribute to the self-development of critical and creative thinking skills, meta-cognition and problem-solving skills in Army leaders?

Assessment of the contribution of PLNs and connectivism to the development of 21st Century thinking skills can only be accomplished once those skills are identified. Coming to the same conclusion for education in general, Greenstein (2012) examined a broad range of public and private descriptions of 21st Century thinking skills and concluded that critical and creative thinking, problem-solving and metacognition were the consensus major categories of such skills.

To answer this third research question respondents were asked about each of the four 21st Century thinking skills. For each of the four thinking skills the respondents were asked, “How did learning through the use of your PLN and your connection to other learners affect the development of your thinking skills?"

Critical Thinking

Respondents suggested that self-development through connected learning and expanding PLN raised the level of critical thinking beyond that they developed in institutional and organizational education and training. Lieutenant Audrey remarked, “I developed critical thinking about second and third order effects due to connected learning. Also organizational effects and thinking more strategically over time.” Lieutenant Charlie stated, “Self-development gives me a chance for academic discourse I don’t get in Army schools. And, also to learn those topics not easily taught in schools.” Captain Neil suggested:

> I didn’t really learn anything about critical thinking in the Career Course. But I learn a lot about critical thinking playing video games. It may be playing and it may be fun, but it sharpens your mind and forces you to make decisions rapidly.

The critical thinking of respondents was broadened by exposure to different perspectives through expanding PLN. Lieutenant Charlie observed, “The internet improves critical thinking by offering alternative viewpoints.” Major Doug stated, “Through self-development I’ve gotten a feel for how decisions are made. I see more than one side to a story…I think I have a more open mind, not blindly accepting what is read or said.” Lieutenant Ike stated, “There is no substitute for going out and finding new

ways of doing stuff. It teaches me to approach the same issues from very, very different perspectives." Captain Mel had voluntarily taken a civilian leadership course. As a result of her exposure to different, civilian, viewpoints, she observed, "I realized the lenses that you see things through."

Respondents suggested that critical thinking skills development and improvement gained through connected learning in their self-development carried over into improvement in their regular day-today duties, training and execution of missions. Lieutenant George said, "Because of my participation on the internet and writing short responses to blogs I've become more reflective. This transfers over to my daily work and thinking critically instead of just jumping into execution." Lieutenant Ike had a similar opinion, "learning is the training for your critical thinking skills. It teaches me to read more critically and to write better." Captain Lou observed, "The ability to make connections between sources of learning enables more critical thinking at work. But, it can lead to over-thinking things." Lieutenant Kelly stated, "I was learning things on line even when at the NTC [National Training Center] and when deployed and I was applying it real time."

Major Hal offered a different opinion. He felt that his critical thinking skills came from institutional courses such as the Red Team Course [formal name the University of Foreign Military and Cultural Studies] and the Basic Strategic Arts Program. He suggested that self-development activities only refined those skills.

Creative Thinking

Respondents approached creative thinking from two aspects. The first was their inclination or motivation to be creative and the second was how to be more creative or innovative. Officers who engaged in on-line video gaming described both increased motivation toward and an improvement in their creativity. Lieutenant Charlie stated, "Video games…real time strategy has helped immensely in improving creativity. Starcraft, that I play with a peer group of officers…you have to be creative to win." Lieutenant Neil spoke also of video games developing creativity, "Every time is different, no two situations are alike…if you are not creative, you die."

Captain Young described his motivation toward creative thinking, "Every day I seek out people I don't know and engage them. I have a conversation with somebody new every day. This extends my creative nature." He went on to say, "I also have conversations with my peers. They continuously challenge me and give me problems that are hard to solve. This drives my creativity."

Respondents described the impact the development of creative thinking skills through connected learning self-development had on their development of new approaches. Lieutenant Audrey observed, "As a result of my self-development I am more of an artist in mission command, better at painting a picture. And, I am more inclined to provide creative solutions to higher…I provide creative solutions to others on the net" Major Doug described improving his creative thinking through creation of new knowledge from multiple sources. He noted reading about the psychology of how before each major battle Admiral Nelson came up with a creative solution to a different

problem. Lieutenant Ed stated, “The internet rewards imagination…it gives you positive feedback.” Lieutenant Oscar observed, “Until we did the self-development class [the case] I had never really thought about being creative on the battlefield. But, what I learned about deception really got me thinking.”

In addition to video gaming there was a wide variety of sources of improving creative thinking. Lieutenant George stated, “I watch TED talks…the one by Stan McCrystal [retired U.S. Army General] on national service got me thinking about being innovative.” Major Hal observed, “Most of my creative thinking has come from reading science fiction and things outside the military.” Captain Lou suggested his reading of strategic issues and army challenges has improved his creative thinking, “Rebalance [a term of art for regaining military capabilities lost during the wars since 9/11] requires creative thinking. We have to come up with different ways of doing something.” Captain Mel also sought different sources, “Creative thinking I don’t get from the military, I get it from cultural activities outside the military.” Lieutenant Pete pointed out, “If you want to find creative solutions to talent management you have to go outside the Army and look to business. That’s where the new ideas are.”

Meta-cognition

Meta-cognition, as an awareness and understanding of one’s own thought processes (Meta-cognition, 1989), or “how we think about thinking,” was considered by the respondents to be significantly impacted by connected self-development. Lieutenant Charlie said, “My focus of learning is, how is this useful to me. Usefulness is related to the future and changing self over time.” Major Doug suggested, “Interacting on the

internet has caused me to use metaphor more in my thinking, whether to introduce new concepts or in thinking about history." Lieutenant Ed observed, I have to avoid seeing too many shades of grey."

Respondents discussed how their thinking had changed as a result of connected learning. Lieutenant George suggested, "When I am learning on my own I tend to spend more time in intensive learning…I have a higher level of focus because of self-development." Lieutenant Ike stated, "My self-development has been shaped primarily by my reading and mentorship. This has led to my always having another question in the back of my mind." Lieutenant Rob observed:

> I think how I think has changed three times while I have been in the Army. First, while I was at West Point. Second, when I was in the Basic Course and learning to be a platoon leader, and now that I am learning through the internet and talking to others outside my company.

Major Hal had a slightly different opinion, "My self-development hasn't affected my meta-cognition as much as my formal anthropology training."

Problem Solving

Respondents were generally of the opinion that connected self-development helped them to improve their problem solving. Part of the improvement in problem solving came from having a broader PLN and sources of learning. Major Doug said, "With connected learning my problem solving is quicker because I have a loaded deck. It's like being a DJ at a wedding. You know the playlist and can read the crowd and pull out the right song." Captain Victor stated, "My problem solving is improved by reading

editorials and watching the Sunday morning talk shows…makes me think." Major Hal pointed out, "My problem solving has really improved from reading books." Captain Lou stated, "Just talking to different people helps me with my problem solving."

Another impact on problem solving noted by respondents was in thinking about problems in ways that were different from when they just relied on institutionally developed problem solving skills. Lieutenant George observed, "I can understand other perspectives better and solve problems. I learned to be more open to solutions of other folks." Lieutenant Ike stated, "Before I came in the Army I was an internal problem-solution guy. Now I view problems through second and third order effects and motivations. I try to think relative to the larger mission." He added, "For problem solving I am continuously trying to add tools to the tool chest." Captain John observed, "I find myself being able to see and analyze a problem and finding the easiest way to go about it." Captain Mel observed, "Problem sets in the military are transferable outside the military. Company command is a good example." Captain Steve suggested, "Without outside self-development my tendency would be to just go with the school solution. But in Afghanistan the school solution never seemed to work…Through email and on-line I got new ideas and tried out some things that did work."

Captain Young offered a solution for self-development that incorporated a connectivist approach and levered Web 2.0 technologies in support of improving problem solving:

> Think of an app [software application for smart phones, tablets or computers], call it 'challenge me.' Every day there is a new problem presented for you to solve.

You can also connect to others and have a discussion about the problem and solution. Anyone who links in can enter the discussion, start a new discussion, or offer a solution to the problem.

Summary

This chapter presented the results of the data collection, analysis and findings of the study. The chapter began by restating the purpose and research questions, in order to frame the results and findings. The setting of the case study was then described, to include the actual self-development case, demographics, and participant overview. A description of the piloting of the interview protocols was provided. The data collection effort was described, to include the conduct of interviews and focus groups. Next, the data analysis methodology was described, to include the rationale for the decision to change to LiveScribe from NVivo. Data analysis description included the approach to open, axial and selective coding, and a discussion of discrepant categories. Evidence of trustworthiness, to include credibility (internal validity), transferability (external validity), dependability (reliability), confirmability (objectivity), and ethical procedures were addressed before describing the results.

The results of the case study were presented in two major sections. The first section described the results in terms of six themes that emerged from data analysis. The second section presented the findings in terms of each of the research questions. In both sections significant use of direct quotations provided support for the analysis, results and findings.

In the first section of results, the six themes that emerged from the analysis of data collected from the respondents and the literature review were:

1. Lack of Army support for leader self-development
2. Challenges to current self-development practices
3. Intrinsic motivation necessary for self-development
4. Structuring PLNs around small groups
5. Value of virtual self-development relative to face-to-face
6. Desired characteristics for self-development solutions

For the first theme, with few exceptions, most respondents felt the army did not fully support self-development. Some also felt that what the Army termed self-development wasn't self-development at all, but rather organizational leader development, directed and prescribed. The second theme described the challenges to current Army self-development practices. These included the difficulties employing current Army information technologies and communities of practice, lack of connectivity to learning sources through the Army's closed-loop NIPR network, rotation of personnel that inhibited learners bonding and mentorship, time available for self-development, and perceived unwarranted Army formalization of self-development. The third theme was that of the intrinsic motivation necessary for self-development. Not only did respondents believe intrinsic motivation was necessary, but they also believed that strong mentorship provided an example of and motivation for self-development.

The fourth theme was that of structuring PLNs around small groups. The respondents' feedback on this theme was in contrast to the literature review which

suggested that connectivist approaches center on connections of very large numbers of learners in MOOC and in contrast with current Army focus on service-wide communities of practice of tens of thousands of people. Respondents suggested that connecting to small groups of trusted people was most effective for their self-development. The fifth theme contrasted the value of virtual and face-to-face self-development. Respondents were mixed in their opinions, and made valid arguments in favor of both approaches.

The sixth theme was that of the desired characteristics of a self-development solution for the Army. In simple terms, the case study results suggest that for self-development leaders were most comfortable using the systems and technologies they use every day in their normal life and not having to learn to use and employ separate, unique Army systems just for self-development. From the selective coding analysis, six characteristics of a desired self-development system emerged. These desired characteristics were: relevant, tailorable, available, scalable, exportable and portable.

The second section presented the findings in terms of each of the three research questions. The first research question examined the implications of adopting PLN as a self-development learning environment. From analysis of the data pertaining to the first research question three implications emerged. The first of these implications is that PLN are effectively already the environment of choice of the respondents. This first implication corresponds to the "available" desired characteristic of self-development solutions. The second of these implications is that Army leaders are using open networks and small communities of practice as sources for their PLN, rather than the closed networks and large communities of practice currently in use by the Army. This second

implication corresponds to the "scalable" characteristic of self-development solutions. The third implication is that self-development must be a more robust component of Army leader development and more tightly coupled to institutional and organizational learning. This third implication corresponds to the "portable" characteristic of self-development solutions.

The second research question addressed in what ways a connectivist approach improved self-development in Army units. Analysis of the data collected from the respondents suggests three major implications for the Army from the use of the connectivist approach, both in the self-development case and more generally across the Army. These three implications also correspond to the other three of the six desired characteristics of a self-development solution. The first of these three implications is that Army leaders desire a "student-centric" methodology for self-development. This first implication corresponds to the "relevant" desired characteristic of self-development solutions. The second implication is that Army leaders already informally employ variations of connectivism for their learning to fill gaps in formal leader development programs. This second implication corresponds to the "tailorable" desired characteristic of self-development solutions. The third implication is that Army leaders connect not just to learn, but also to share their learning with others. This third implication corresponds to the "exportable" desired characteristic of self-development solutions.

The third research question asked how the use of PLNs and connectivism contributed to the self-development of critical and creative thinking skills, meta-cognition and problem-solving skills in Army leaders. Findings resulted from the analysis of the

answers of the respondents about each of the four 21st Century thinking skills. Regarding critical thinking skills, respondents suggested that self-development through connected learning and expanding PLN raised their level of critical thinking beyond what they developed in institutional and organizational education and training. Respondents further suggested that critical thinking skills development and improvement gained through connected learning in their self-development carried over into improvement in their regular day-today duties, training and execution of missions.

Respondents approached creative thinking from two aspects. The first was their inclination or motivation to be creative and the second was how to be more creative or innovative. The second was the wide variety of sources of improving creative thinking, to include video gaming, social media sites, and interactions with creative thinkers. Regarding meta-cognition, respondents consider "how we think about thinking" to be significantly impacted by connected self-development. Respondents were generally of the opinion that connected self-development helped them to improve their problem solving, in particular through having a broader PLN and sources of learning. Problem solving was also improved by thinking about problems in ways that were different from when they just relied on institutionally developed problem solving skills.

Having developed themes and answered the research question as a result of analysis, and demonstrated trustworthiness of the research, the final chapter of this dissertation will address the conclusions and recommendations from the study of Army leader self-development. Chapter 5 will provide an interpretation of the findings, examine the impact of the limitations of this study, provide recommendations for further research,

and derive the implications of the research in terms of achieving positive social change.

Chapter 5: Discussion, Conclusions and Recommendations

I employed a qualitative case study research paradigm in order to explore the application of innovations in civilian education to the self-development of leaders in the U.S. Army. The purpose of this study was to examine the use of PLNs (Richardson & Mancabelli, 2009) with a connectivist approach (Seimens, 2004) for establishing and employing learning environments for individual self-development in Army organizations. In order to conduct this study, I employed the following research questions:

- What are the implications of adopting PLNs as the self-development learning environment in the Army?
- In what ways does a connectivist approach improve self-development in Army units?
- How can the use of PLNs and connectivism contribute to the self-development of critical and creative thinking skills, meta-cognition and problem-solving skills in Army leaders?

I began my research with a review of the literature relevant to the purpose of this study. The literature review confirmed the existing gap and deficiencies in Army self-development learning environments and methodologies. My analysis of the literature produced a relationship between key concepts that resulted in a conceptual framework consisting of PLN, connectivism, Web 2.0 technologies, communities of practice and self-regulation. Theories of social constructivism and heutagogy provide a solid basis for connectivism, while communities of practice provide a context for the emergence of PLNs and MOOCs. Learner action is critical to success with PLN and MOOC and that

requires motivation, self-regulation, self-efficacy and virtual presence. Finally, the conceptual framework developed for this research project was supported by the results of the literature review as an approach to addressing the self-development gap by employing PLNs and connectivism.

After conducting the literature review, I collected data through interviews and focus groups with a sample population of 22 Army leaders. The research questions were answered through analysis of the integration of the information from the literature review and the data collected from the respondents. As I detailed in the results section of Chapter 4, my analysis produced six themes, identified six desired characteristics of a self-development solution, and provided answers to the three research questions.

In this chapter Ibuild on the literature review, the conduct of the research, and the results of the data analysis to interpret the findings in terms of both the literature and the conceptual framework. A discussion of the limitations of the study follows, leading into recommendations for further research derived from this work. The chapter then provides a discussion of the implications of the study for positive social change, educational methods, theory and practice. The chapter finishes with a conclusion for the study.

Interpretation of the Findings

The key findings are noted in terms of themes, characteristics and implications in answering the research questions. These findings must be interpreted in the context of the literature, specifically the Army doctrine for self-development, and the conceptual framework in order to draw conclusions and make recommendations that can inform the future of Army leader self-development.

In the Context of the Army Doctrine for Self-development

One of the goals of this research was to examine if PLNs and connectivism, as innovations in education that are being employed in the civilian sector, could be adapted for use in military education, specifically Army leader self-development. The analysis of the crosswalk between the Army's strategy for the self-development domain, the literature of the emerging educational approaches of PLN and connectivism, and the respondents' experiences employing their PLNs and connectivist approaches addresses that goal. Specifically, this research extends the knowledge in the educational discipline by confirming that PLNs and connectivism can--and are in fact already informally being--employed to improve education in the military sector.

The Army Leader Development Strategy (ALDS) describes the self-development domain as follows:

> The self-development domain includes planned and goal-oriented learning that reinforces and expands the depth and breadth of an individual's knowledge base and self-awareness. Self-development bridges learning gaps between the operational and institutional domains and sets conditions for continuous learning and growth. There are three variations: structured self-development, which are mandatory learning modules to meet specific learning objectives and requirements; guided self-development, which is recommended, but optional learning that is intended to enhance professional competence; and personal self-development which is self-initiated learning to meet personal training, education, and experiential goals(U.S. Army, 2013, p. 11).

The first two themes derived from the research, those of respondents' lack of belief in the Army's support for self-development and the challenges to current Army self-development practice, support that the intent of the ALDS with regard to the self-development domain is not being achieved. In the absence of an Army environment and methodology in the self-development domain, respondents are providing their own through their PLNs and their personal variations of a connectivist approach. While answering the second research question on the implications of connectivism for self-development, respondents clearly desired a degree of autonomy, openness, and diversity not suggested by the ALDS three variations of structured, guided, and personal self-development. The sixth theme, that of the respondents' desired characteristics of a self-development solution, suggests that respondents desire at most a semi-structured approach to self-development. Where respondents clearly agreed with the ALDS was that a goal of self-development was to bridge the gap between institutional and organizational leader development. In describing the desired characteristics of self-development solutions as available, portable, tailorable, scalable, relevant and exportable, respondents were also confirming the ALDS goal of continuous learning and growth.

In the ALDS the Army goes on to describe the required conditions in the self-development domain follow the life-long learning model. The findings of this study support each of these required conditions:

- Personal commitment to gain knowledge and to learn.
- Little or no boundaries regarding topics of personal and professional interest.
- Army makes appropriate resources available that are meaningful, engaging to

use, and available when needed, as needed.

- Army limits its desire to direct fields of study for self-development. Leaders encourage and expect that subordinates seek knowledge on any field of study that interests the individual (U.S. Army, 2013, p. 20).

Respondents demonstrated not only their own personal commitment to learning, but in addressing the theme of intrinsic motivation, outlined their belief in the responsibility of all officers to be committed to learning. In the second theme of challenges to current army self-development, participants in the research suggested that while they desired no boundaries in extending their PLN, Army approaches in units and Army technologies limited their capability to do so.

The first two themes of lack of Army support for and challenges with self-development suggest that respondents were not sure the ALDS requirement of providing meaningful, engaging, and available resources was being met. As the ATSC literature suggests (U.S. Army, 2015), much of the Army's resources go to content development and structured self-development, when what the respondents desired was to find their own content and to apply their own learning styles. Regarding the last ALDS requirement of not directing fields of study, many respondents were frustrated with the traditional use of professional development classes, with commander directed topics, for self-development.

In the Context of the Conceptual Framework

In responding to the interview protocols and providing their input, the officers participating in this study addressed each of the components of the conceptual framework and in doing so confirmed the relationship of components to each other and to effective self-development.

The foundation for the conceptual framework was that of connectivism with its four tasks of connect, curate, create and share and its four principles of autonomy, connectedness, diversity and openness. In answering the second research question and in describing their approaches to self-development both within the self-development case and more generally in their careers, the respondents confirmed their execution of the four tasks. The respondents also suggested relationships in their own self-development activities between the connectivist tasks and principles. In particular, officers linked the connect task of connectivism with the principles of autonomy and openness, especially with their focus on extending their PLN beyond the limits of their unit and the Army and more broadly into the civilian, academic, business and social world.

One of the important conclusions from the literature review was the necessity for learner action through self-motivation, self-regulation and self-efficacy and virtual presence in order for education learning based on PLN and connectivism to succeed. The results of this research study confirm the existing literature on the importance of motivation to PLN and connectivism. The third theme derived from the responses to interviews and focus groups was the necessity of intrinsic motivation for self-development to occur. While not using the doctrinal terms, Captain Young stated simply,

"Effective self-development is like individual physical training. It takes a combination of confidence and humility to achieve."

The respondents' use of Web 2.0 technologies, while not universal, was extensive and consistent with the impact existing literature and research suggested such technologies were having on education and specifically connected learning. The second theme derived from responses in interviews and focus groups highlighted the frustration respondents had with the limitations of information technologies currently in use by the Army. In contrast, analysis in answering the first research question on PLN demonstrated respondents' confidence in their use of Web 2.0 enabled social media, and in particular Facebook, for connected learning and self-development. Captain Young's suggestion for a "Challenge Me" app that would improve problem solving is an example of the innovative approaches to employing Web 2.0 technologies the literature captured in the civilian sector being applied to military self-development.

The third pillar of the conceptual framework was that of communities of practice. If communities of practice are in fact "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott and Snyder, 2002), then the small groups described by respondents for self-development are the preferred military versions of communities of practice. Lieutenant Oscar's lieutenants that meet monthly at the golf course and Major Frank and Major Hal's descriptions of small groups, sharing a passion for a subject, interacting on a routine basis to learn, perfectly fits Wenger's definition. The second implication arrived at in answering the first research

question about PLN was that respondents preferred small groups over very large ones. While Wenger, McDermott and Snyder did not describe an optimum size, this finding does have implications for the Army's approach to the self-development domain. In this case bigger is not necessarily better.

Two attributes of PLN stand out from the literature. One is that PLN enable the learner to place learning in a relevant context with real world attributes. Enabled by digital Web 2.0 technologies PLN provide the dimensions of context necessary for learning in a virtual world (Westera, 2011). The second is that learners extend their PLN through access to other learners through a variety of means (Kop, 2011). In providing responses that enabled derivation of the relevant and tailorable desired characteristics of self-development solutions, and development of the theme of the value of virtual and face-to-face connections, participants in the study confirmed the first of those two attributes of PLN., that of context. The first implication derived from answering the first research question, that PLN are effectively already the environment for self-development, reinforces that first attribute of context. The second attribute of PLN, that of extension of PLN through a variety of means, was illustrated through the desired characteristics of availability, portability, exportability and scalability, as well as through the wide variety of different connections and sources of learning each respondent suggested when describing their PLN.

Limitations of the Study

In designing the methodology of this research certain limitations were identified. Case studies are excellent for the development of themes that enable the observer to draw

inferences from what is observed. The six themes derived do in fact enable the development of implications for the Army. These implications will enable the Army to make more informed decisions about the application of PLNs and connectivism to leader self-development. However, case studies generally do not support the development of new theories, as a grounded theory approach to the research might have, so this study is limited to learning about the application of PLNs and connectivism, not creating a new educational approach. Instead, the implications for Army self-development present opportunities wherein the Army can improve design and execution of the self-development domain within the ALDS. Like most case studies, this case was limited in the sample population and the observable activities, which impacts on the transferability and dependability of the observations, findings and conclusions.

In conducting this research, my own experience as an Army officer, my familiarity with training and education in Army units, and my own interest in innovations in education such as PLNs and connectivism introduced a certain amount of bias into the effort. The specific educational innovation examined was further impacted by my tacit theory that motivation and self-regulation would impact the learner's success using PLNs and connectivism. Deliberate use of an extensive set of codes, a deliberate and uniform semistructured interview protocol for data collection, and the use of the LiveScribe audio pen and analytic support software lessoned the impact of bias. Additionally, piloting the interview protocols enabled me, as researcher, to practice asking the questions in a way that elicited responses while minimizing bias.

Potential limitations to this study include validity and dependability. Maxwell (2013) suggested that the researcher must address validity threats after a tentative conclusion, in this case the themes, has been made. By employing the results first to derive the themes and then in a second round of analysis, to answer the research questions, the validity threats were addressed. Maxwell also identifies research bias and reactivity as two major validity threats. Applying Maxwell's validity test checklist (Maxwell, pp. 125-129) will improve validity, including:

- Intensive long-term involvement – The research period was approximately two months, and included both the self-development case and the data collection, long enough for researcher and respondents to become familiar with each other and reduce validity errors from single source observations.
- Rich data – Using field notes to capture rich observations and the LiveScribe audio recording interviews and focus groups assisted with the richness of the data.
- Respondent validation – All interviews were recorded in sequence. This enabled checking initial observations, coding, themes and analysis against later interviews and interviewees can validate conclusions. Multiple quotes were employed in support of any findings.
- Recording discrepant evidence and negative cases – Discrepant cases were identified and analyzed and included in the research report in Chapter 4 to ensure that alternative views were accounted for.

Recommendations

As a result of this research a number of recommendations emerged that can assist the Army to improve leader self-development. When the Army seeks to improve capabilities, it employs a framework that organizes such improvements or innovations into categories of doctrine, organization, training, materiel (which includes technologies), leader development, personnel, or facilities, termed DOTMLPF. Within the DOTMLPF framework, the recommendations of this research include doctrinal, materiel, and organizational. All the recommendations affect the training and leader development categories of DOTMLPF.

Doctrinal Recommendations

In terms of doctrine, the Army ought to expand its doctrine for self-development, to include the guidance and recommendations for developing and employing PLN, in Army Doctrinal Reference Publication 7.0 (ADRP 7.0), Training and Leader Development and in the Army Learning Concept for 2015 (ALC). Expanded doctrine ought to incorporate PLN and connectivist methodology as the primary environment and methodology respectively for self-development. the move away from an Army-wide, institutional-centric environment and toward a student-centric PLN environment will provide the relevance and tailorability that respondents suggest will improve Army self-development.

While the ALDS recognizes the capability for self-development to fill in the gaps and connect the learning between the institutional and organizational domains, ADP 7.0 and the ALC, as the primary doctrinal publications for leader development, do not. This

role for self-development ought to be recognized and formalized in doctrine and accounted for in career-long leader development.

Army leader self-development doctrine ought to be more specific about ways in which leaders can connect with a diverse set of fellow learners and sources of information in order to accomplish the learning objectives that they each define. This takes a doctrinal student-centric approach that translates the objectives of the ALDS and ALC into reality.

Materiel Recommendations

In terms of materiel recommendations, the Army ought to make commercial internet more available in Army offices and work areas and ensure greater WiFi or satellite connectivity across all its bases and training areas. This will enable leaders to employ PLN and connectivist approaches regardless of where they are on the base, or in the training area, and ensure the availability the respondents suggested was necessary. Materiel recommendations bring with them a cost and certainly extending connectivity across Army bases can be expensive, but the payback is better educated and informed leaders who will make better decisions, saving lives and resources when they do.

Organizational Recommendations

There are several organizational recommendations. First, across the Army education, training and other organizations ought to make their products and information readily accessible via social media sites, such as Facebook, Twitter or blogs, rather than official sites that are rarely used and resource intensive to develop and maintain. This will enable Army leaders to access information via the means they most often use and allow

for transfer across their own PLN without having to switch from .mil domains to .com or .edu domains. This will answer the respondents' desire for portable, exportable and scalable solutions for self-development.

Information producing organizations such as Center for Army Lessons Learned (CALL), Army Research Institute (ARI), and the Foreign Military Studies Office (FMSO) could sponsor groups on Facebook or Linked-In and post their products on Twitter, thus potentially reaching more learners and having a greater impact Army leaders learning, understanding, problem solving and decision making. This also addresses the available, portable, scalable and exportable desired characteristics of a student-centric instead of institution-centric approach.

The third organizational recommendation is for the Army Training Support Command's (ATSC) role to transform from generators and distributers of content (U.S. Army 2014) to enablers of connected learning and sharing. This suggests that ATSC develop capabilities and approaches to make Army self-development more open in order to enable leaders to connect to and share what they have learned with others. If leaders can connect to and share their learning with other Army learners primarily through Facebook, YouTube and on-line journals, then the Army official primary environment for self-development ought to be social media rather than the restricted and limited content and connections available through current ATSC official sites.

Leader Development Recommendations

A leader development solution is to introduce leaders to PLN and connected learning in precommissioning or BOLC instruction, coupled with practical exercises in

developing and employing small, open communities of practice, as desired by the respondents. This would assist the Army to move away from the large, closed communities of practice currently in use, such as AKO site that can not be scaled.

Recognizing that each Army rank and branch has certain knowledge, skills, and attributes that the officer must demonstrate, the development of those officer characteristics could be mapped out across institutional, organizational and self-development learning. This would enable each individual to map out for themselves a "learning continuum" that spans institutional, organizational and self-development. Such a learning continuum would be in part defined by the knowledge, skills and attributes the Army desires to be developed in every officer and in part by the individual learning desires and styles of each officer.

Another leader development recommendation is to expand the ARDOCC connectivist approach to its full catalogue of DL courses. Secondly, the Army ought to consider structuring an on-line capability for individuals and units to develop and employ their own ARDOCC courses, either for individual self-development or for semi-structured leader development in units. Concurrently, the Army ought to set conditions for employing a connectivist methodology in part by adapting existing distance learning (DL) courses into a connectivist format.

Semistructured Self-development

When the ALDS strategy for the self-development domain is combined with the ALDS required conditions, and then aligned with the research derived themes and desired characteristics of a self-development solution, an opportunity emerges. That opportunity

is for the Army to build upon the approach of the MOOC-like ARDOCC and promulgate a doctrine for "semi-structured self-development."

Semistructured self-development would start with the understanding that there are subjects or topics that the Army would like an officer to learn at some point during his or her career, but there are also subjects that the officer wants to learn. When an officer arrives at a unit, he or she and their commander discuss and select some number of topics for self-development. For example, an engineer Battalion Commander might suggest river crossings and leadership for study, while the officer might suggest supply accountability and American military history. Having agreed on the topics, the officer builds his or her PLN, including the commander. When this is applied across the immediate subordinates of a leader, which are generally 5-7 personnel, a small group of learners, each with their own PLN is connected together. This meets the small group community of practice approach suggested by the respondents. Then, for each topic the officer executes the connect, curate, create, share connectivist approach. None of this precludes the officer from conducting other self-development activities as desired, nor does it preclude the commander from conducting regularly scheduled leader development classes. Such an approach addresses each of the six themes by demonstrating an Army focus on self-development, overcoming current challenges, motivating through a leader-centric approach, structuring self-development around small groups, integrating virtual and face-to-face learning, and applying all six of the desired characteristics of a self-development solution.

The broader Army role for organizations such as ATSC and TRADOC is to enable semi-structured self-development by opening networks so that learning is more portable and exportable, making content more broadly available and relevant, and by avoiding the directive approaches that reduce scalability and tailorability. The semi-structured approach described here would in fact meet all the required conditions outlined in the ALDS for self-development. Army institutional education could assist by providing training for new officers in establishing PLN and employing Web 2.0 technologies in support of connected learning.

Recommendations for Further Research

Based on the review of literature on research into the subject of connectivism, there has been little such research embedded in the military environment. As one of the first studies of connectivism as applied to military leader development this research suggests several potential follow-on studies. The subject of this research was the self-development domain, one of three leader development domains recognized by the Army. Additional research could be conducted into the use of PLN and connectivist methodologies for the other two domains, organizational and institutional learning.

Critical thinking, creative thinking, meta-cognition and problem-solving were addressed in terms of the respondents' opinions of the impact of connected learning on the development of those skills. But, how each of those 21st Century thinking skills is developed through the application of PLN and connectivism to learning could be explored in much greater depth. Additionally, each of the six desired characteristics of a self-development solution could be explored individually in more depth.

Implications

Positive social change

It may seem somewhat odd to argue that improving the Army, an organization whose primary purpose is to kill people and destroy things, is positive social change, but it is. This is because the role of the Army is to execute the operations necessary to, in the words of the preamble to the U.S. Constitution, "provide for the common defense…and secure the blessings of liberty to ourselves and our posterity" (U.S. Const. pmbl). When we refer back to the educational need we identified at outset of this research, it becomes clear that improving Army leadership is positive social change. At the mega level, that of the entire Army and the Nation, a learning environment and methodology for self-development that produces a better educated and more effective officer and non-commissioned officer corps, can help us to deter future wars, and deterring war, so that we never have to fight at all, is the best means of providing for the common defense and securing the blessings of liberty. If deterrence fails and the Army is ordered to war, then more capable leaders can execute military operations in a manner that defends the Nation, while limiting the loss of human life and significant expenditure of the Nation's resources.

At the macro level, that of Army organizations such as the one that participated in the self-development case study, a semistructured approach to self-development enables collaborative learning which will improve organizational effectiveness. Connected learning, enabled by PLN and connectivism, enhances cohesion and team effectiveness. As suggested by this research, connected learning can improve meta-cognition and

problem-solving. In order to succeed in the very complex environments such as Iraq and Afghanistan, leaders require thinking more effectively and solving very complex problems such as that presented by ISIS' terrorism throughout the Middle East. Self-development that improves the problem solving of our organization and unit leaders can defeat such threats to regional peace and national security and reduce, or possibly eliminate, the atrocities and murders that ISIS perpetrates.

Army organizations, to include the Army Reserve and National Guard, also contribute to humanitarian assistance and disaster response at home and abroad, contributing to the preservation of life and property. The Army responded to hurricanes such as Katrina in 2005, earthquakes such as that in Haiti in 2010 and Japan in 2011, and yearly to major wildfires across the Nation. Such large scale responses to very complex disasters require leaders with effective thinking skills to include critical and creative thinking and problem solving. If Army leaders are more prepared intellectually they can respond to such disasters more effectively and reduce the adverse effects, damage and loss of life that accompanies such incidents.

At the micro level a learning environment for self-development improves individual learning, improves thinking skills and promotes self-development. Effective critical and creative thinking, enabled and improved through connected learning and self-development, can improve the planning and decision making of the individual leader. Leaders who can plan and decide more effectively can lead teams in combat and accomplish their assigned missions while saving the lives of their Soldiers. Every Soldier is someone's son or daughter, husband or wife, father or mother and the life of each

Soldier is absolutely precious. There is possibly no greater example of positive social change.

Methodological implications

Conducting a case study in which the participants were members of the armed forces requires a methodological approach in some ways more challenging that that with civilian personnel. In order to ensure that the respondents were protected from adverse actions that might occur based on their participation and to preserve data collection from outside influence by the chain of command additional methodological precautions had to be taken. Following the IRB, all data collection and analysis procedures were explained to and approved by AHRPO to ensure additional protections were in place to protect the individuals and the quality of the data. Recruiting, consent, interviews and focus groups were conducted without any reference to or knowledge of the chain of command beyond a simple letter of support by the unit commander. Focus groups members were all of the same rank in order to ensure seniors did not influence subordinates' answers. This additional layer of effort was necessary and added time, but was not too challenging.

Theoretical Implications

The conduct and results of this research suggest that the concepts that comprise the conceptual framework apply not only to civilian learning, but also to Army leader development. The results of the study suggest that the conceptual framework of the relationships between connectivism, PLN, Web 2.0 technologies, communities of practice, and motivation as they affect self-development was in fact a model that enabled the examination of connected learning for Army leader self-development.

One of the theoretical implications of this study was the recognition that Army respondents preferred connected learning in small groups, rather than the very large groups that connectivist inspired MOOC advocates suggest. From a theoretical perspective, this suggests that the quantity of participants in connected learning is not necessarily more important than the quality of the participants.

Another theoretical implication was the derivation of the six desired characteristics of self-development solutions. Additional research is probably required to confirm or adjust the six characteristics, to explore their application to educational design, and, perhaps most importantly, to add the characteristics to the theory of connectivism.

Recommendations for Practice

MOOCs as conducted in 2015 come in two types. One type is basically distance learning or eLearning courses that are opened to anyone who wants to enroll, participate in, and complete the course. In that respect they are not too much different than any on-line course. The other type employs connectivist approaches, so that the connected learning is much more student-centric and semi-structured. Examples of this later type include 2010 Edfutures MOOC, and the 2010 Personal Learning Environments and Knowledge (PLENK2010) (McAuley, Stewart, Siemens & Cormier, 2015). This research suggests that while current Army practice for on-line learning resembles the first type, the second, more student-centric and semi-structured type may be equally applicable and produce the educational and leader development results desired in the ALDS and ALC.

Conclusion

Think of how you use your smart phone to learn. First, it is *available.* You can pull it out whenever you like and learn what you need to learn. You don't have to wait until August when the next Command and General Staff Officer's Course starts in order to learn. Next, it is *portable.* You can take your education with you no matter where you go. You don't have to leave your Captain's Career Course learning behind just because you finish the course and move to a unit at Fort Riley. You can take your smart phone and learn on leave, your education is not tied to the secure Army networks. Smartphone learning is *Scalable*. You can learn as much or as little as you'd like about a subject; depending on your interest, time and priorities. Next, it is *Tailorable*. There is no fixed curriculum with a smart phone. Each person can tailor the learning to their needs. You may focus on the history of river crossings, while another may focus on the technologies available for river crossings. Smartphone learning is *Exportable*. Education is not tied to the schoolhouse, but can be taken to the unit and conducted there. And, most importantly, your learning is *Relevant*. You learn what you need to, when you need to and you don't have to learn anything that is not relevant to your educational needs. You can even use your smart phone to learn something critically important to you while you are engaged in a combat operation. Learning doesn't get any more relevant than that.

The metaphor of the cellphone for learning captures the essence of the results of this research. The six characteristics of connected learning suggest the advantages of employing PLN and connectivism for Army leader self-development, but these characteristics are equally applicable to civilian learning. Army respondents desire to

learn about their profession in the same way they learn about everything else, not in a different, more limited and constrained manner. The findings of this study, informed as they were by the professional opinions of Army leaders who employ the self-development systems in use today, suggest that the PLN and connectivist innovations currently taking place in the world of civilian education, can also be applied to military education. The recommendations resulting from this study, if applied within the framework of the Army Leader Development Strategy, can assist in adapting Army doctrine, organizations, material, and approaches in order to achieve the objectives of the Army Learning Concept for 2015 and help produce the leaders the Army needs to win our Nation's wars and bring our Soldiers back alive.

References

Abbé, A., & Halpin, S. (2009). The cultural imperative for professional military education and leader development. *Parameters, 39*(4), 20-31. Retrieved from http://strategicstudiesinstitute.army.mil/pubs/parameters/Articles/09winter/abbe%20and%20halpin.pdf

Allen, C. (2011). Assessing the Army profession. *Parameters. 41*(3) 73-86. Retrieved from http://strategicstudiesinstitute.army.mil/pubs/parameters /Articles/2011autumn/Allen.pdf

Anderson-Inman, L. (2009). Thinking between the lines: Literacy and learning in a connected world. *On the Horizon, 17*(2), 122-141. doi:10.1108 /10748120910965502

Anderson, T. & Dron, J. (2011). Three generations of distance education pedagogy. *The International Review of Research in Open and Distance Learning, 12*(3), 80-97. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/890/1663

Atwell, G. (2010, April 4). Informal learning and why the training model does not work [Web log post]. Retrieved from http://www.pontydysgu.org/2010/04/informal-learning-and-why-the-training-model-does-not-work/

Baggaley, J. (2012). Thesis and antithesis. *Distance Education. 33*(1), 117-123. doi:10.1080/01587919.2012.667963

Balasubramanian, K., Thamizoli, P., Umar, A., & Kanwar, A. (2010). Using mobile phones to promote lifelong learning among rural women in southern India. *Distance Education, 31*(2), 193-209. doi:10.1080/01587919.2010.502555

Barab, S., Gresalfi, M., & Arici, A. (2009). Why educators should care about games. *Educational Leadership, 67*(1), 76-80. Retrieved from http://gamesandimpact.org /wp-content/uploads/2012/08/ARX_transplay.pdf

Barnes, K., Marateo, R., & Ferris, S. (2007). Teaching and learning with the net generation. *Innovate, 3*(4), 1 Retrieved from http://www.innovateonline.info /index.php?view=article&id=382

Barnett, J., McPherson, V., & Sandieson, R. (2013). Connected teaching and learning: The uses and implications of connectivism in an online class. *Australasian Journal of Education and Technology, 29*(5). Retrieved from http://ajet.org.au /index.php/AJET/article/viewFile/243/757

Bell, F. (2010). Network theories for technology-enabled learning and social change: Connectivism and actor-network theory. In *Networked Learning Conference 2010: Proceedings of the 7th International Conference on Networked Learning.* Retrieved from http://www.lancaster.ac.uk/fss/organisations/netlc/past /nlc2010/abstracts/PDFs/Bell.pdf

Bell, F. (2011). Connectivism: Its place in theory-informed research and innovation in technology enabled learning. *The International Review of Research in Open and Distance Learning, 12*(3), 98-118. Retrieved from http://www.irrodl.org/index.php /irrodl/article/view/902/1664

Berge, Z. (2008). Changing instructor's roles in virtual worlds. *The Quarterly Review of Distance Education, 9*(4), 407-414. Retrieved from https://books.google.com /books?hl=en&lr=&id=lyhuj4SAqrEC&oi=fnd&pg=PA407&dq=Berge,+Z.+(200

8).+Changing+instructor%E2%80%99s+roles+in+virtual+worlds.+The+Quarterly+Review+of+Distance+Education.+9(4),+407-414&ots=t3rsSOokH7&sig=1IHJDOwh2sxooegdQCByElg6Reg#v=onepage&q&f=false

Blackman, D., Connelly, J., & Henderson, S. (2004). Does double-loop learning create reliable knowledge? *The Learning Organization, 11*(1), 11-27. doi:10.1108/09696470410515706

Blaschke, L. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distance Learning, 13*(1), 56-71. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/1076/2087

Bloom, B., (1956). *Taxonomy of educational objectives. Vol I: Cognitive domain.* New York: McKay.

Bloor, M., & Wood, F. (2006). *Keywords in qualitative methods.* Thousand Oaks, CA: Sage.

Boitschwarelo, B. (2011). Proposing an integrated research framework for connectivism: Utilizing theoretical synergies. *International Review of Research in Open and Distance Learning, 12*(3), 161-180. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/881

Bolman, C., Tattersall, C., Waterink, W., Janssen, J., van den Berg, B., Van Es, R., & Koper, R. (2007). Learners' evaluation of a navigational support tool in distance education. *Journal of Computer Assisted Learning, 29*, 384-392. doi:10.1111/j.1365-2729.2007.00223.x

Brennan, K. (2013). In connectivism no one can hear you scream: A guide to understanding the MOOC novice. *Open Education.* Web log: retrieved from http://www.hybridpedagogy.com/journal/files/guide_to_the_MOOC_novice.html.

Brown, T. (2005). Beyond constructivism: Exploring future learning paradigms. *Education Today.* 2, 1-11. Retrieved from http://www.bucks.edu/old_docs/academics/facultywebresources/Beyond_constructivism.pdf

Campbell, B. (2012). Innovative leadership: Insights from a learning technologist. *The Quarterly Review of Distance Education.* 13(4), 233-240. Retrieved from http://search.proquest.com/openview/d76ab716fd759d8e56478347f2d6b426/1?pq-origsite=gscholar

Churches, A. (2009). Bloom's Digital Taxonomy. Web log: *edorigani.* Retrieved from http://edorigami.wikispaces.com.

Cicciarelli, M. (2007). Behavioral, cognitive and humanistic theories: Which theories do online instructors use. *International Journal of Information and Communication Technology Education.* 3(4), 1-12. doi:10.4018/jicte.2007100101

Clara, M. & Barbera, E. (2013). Learning online: Massive open online courses (MOOCs), connectivism and cultural psychology. *Distance Education.* 34(1), 129-136. doi:10.1080/01587919.2013.770428

Cormier, Dave (2008). Rhizomatic education: Community as curriculum. *Innovate: Journal of Online Education.* 4(5), 2. Retrieved from http://nsuworks.nova.edu/innovate/vol4/iss5/2

Couros, A. (2009). Open, connected social – implications for educational design. *Campus-Wide Information Systems.* 26(3), 232-239. doi:10.1108/10650740910967393

Cowan, P., Neil, P., & Winter, E. (2013). A connectivist perspective of the transition from face-to-face to on-line teaching in higher education. *iJET*. 8(1), 11-19. doi:10.3991/ijet.v8i1.2346

Creswell, J. (2007). *Qualitative inquiry & research design: Choosing among five approaches.* Thousand Oaks, CA: Sage.

Davis, C., Edmunds, E., & Kelly-Bateman, V. (2013). Connectivism. *Emerging Perspectives on Learning, Teaching and Technology.* Retrieved from http://epltt.coe.uga.edu/index.php?title=connectivism.

Davis, K., Hallam, G., Henry, K., Davis, W., Fairbairn, K. & Heidelberger, E. (2012). Connecting across continents: Collaborative learning in a web 2.0 world. *New Library World.* 113(9/100, 415-428. doi:10.1108/03074801211273894

Deci, E., Vallerand, R., Pelletier, L. & Ryan, R. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*. 26(3), 325-346. doi:10.1207/s15326985ep2603&4_6

Dempsey, M. (2011). Leader development. *Army.* 61(2), 25-28. Retrieved from http://www.ausa.org/publications/armymagazine/archive/2011/2/Documents/Dempsey_0211.pdf

Downes, S. (2010). Learning networks and connected knowledge. In Yang, H. and Yuen, S. (Eds.) *Collective intelligence and elearning 2.0: Implications of web-based*

communities and networking. Hershey, PA: Global. doi:10.4018/978-1-60566-729-4.ch001

Downes, S. (2011). Connectivism and connective knowledge. *Huffington Post.* Retrieved from http://www.huffingtonpost.com/stephen-downes/connectivism-and-connecti_b_804653.html

Dunaway, M. (2011). Connectivism: Learning theory and pedagogical practice for networked information landscapes. *Reference Services Review.* 39(4), 675-685. doi:10.1108/00907321111186686

Falleson, J., Keller-Glaze, H., & Curnow, C. (2011). A selective review of leadership studies in the U.S. Army. *Military Psychology*. 23, 463-478. doi:10.1108/00907321111186686

FM 7.0, *Training Units and Developing Leaders for Full Spectrum Operations.* February 2011.

Fournier, H., Kop, R. & Durand, G. (2014). Challenges to research in MOOCs. *Journal of Online Learning and Teaching.* 10(1), 1-16. Retrieved from http://www.academia.edu/10302119/MOOC_Learning_Experience_Design_Issues_and_Challenges

Fox, C. and Risconscente, M. (2008). Metacognition and self-regulation in James, Paiget and Vygotsky. *Education Psychological Review.* 20, 373-389. doi:10.1007/s10648-008-9079-2

Fredette, M. (2013). How to convert a classroom course into a MOOC. *Campus Technology.* August 2013 digital edition retrieved from

http://campustechnology.com/articles/2013/08/28/how-to-convert-a-classroom-course-into-a-mooc.aspx.

Frohberg, D., Goth, C. & Schwabe, G. (2009). Mobile learning projects – a critical analysis of the state of the art. *Journal of Computer Assisted Learning.* 25, 307-331. doi:10.1111/j.1365-2729.2009.00315.x

Frymier, A. (1993). The impact of teacher immediacy on students' motivation: Is it the same for all students? *Communication Quarterly.* 41(4), 454-464. doi:10.1080/01463379309369905

García, B., Tenorio, G., & Ramírez, M. (2015). Self-motivation challenges for student involvement in the open educational movement with MOOC. *RUSC. Universities and Knowledge Society Journal, 12*(1). pp. 91-103. doi:10.7238/rusc.v12i1.2185

Gatta, M. (2008). Low-skill workers, technology, and education: A new vision for workforce development policy. *The Economic and Labour Relations Review.* 19(1), 109-127. doi:10.1177/103530460801900108

Gibson, T. (2012). Building collaboration through shared actions: The experience of the Global Network for Disaster Reduction. *Jamba.* 4(1), 1-6. doi:10.4102/jamba.v4i1.48

Gerstein, J. (2013). Teacher agency: Self-directed professional development. *User Generated Education*. Web log retrieved from http://usergenertaededucation.wordpress.com/2013/11/11/teacher-agency-self-directed-professional-development.

Greenstein, L. (2012). *Assessing 21st century skills: A guide to evaluating mastery and authentic learning.* Thousand Oaks, CA: Sage.

Hartnett, M., St. George, A. & Dron, J. (2011). Examining motivation in online distance learning environments: Complex, multifaceted, and situation-dependent. *The International Review of Research in Open and Distance Learning.* 12(6), 20-37. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/1030

Hase, S. & Kenyon, C. (2007). Heutagogy: A child of complexity theory. *Complexity: An International Journal of Complexity and Education.* 4(1), 111-118. Retrieved from http://ejournals.library.ualberta.ca/index.php/complicity/article/view/8766/7086

Hogg, N. & Lomicky, C. (2012). Connectivism in post-secondary online courses. *The Quarterly Review of Distance Education.* 13(2), 95-114. Retrieved from http://search.proquest.com/openview/7290753b3936a31e5e9687ed53f3b29b/1?pq-origsite=gscholar

Huang, J., Yang, S., Huang, Y-M. & Hsiao, I. (2010). Social learning networks: build mobile learning networks based on collaborative services. *Educational Technology and Society.*13(3), 78-92. Retrieved from http://www.ifets.info/journals/13_3/9.pdf

Huitt, W. 2011 (2011). Motivation to learn, an overview. *Educational Psychology Interactive.* Valdosta, GA: Valdosta state University. Retrieved from http://www.edpsycinteractive.org/topics/motivation/motivate.html

Jacobs, R. (2014). Perspectives on adult education, human resource development, and the emergence of workforce development. New Horizons in adult education and Human Resource Development. 26(1), 13-21. doi:10.1002/nha3.20049

Jha, A. (2012). Epistemological and pedagogical concerns of constructivism: relating to the educational practices. *Creative Education.* 3(2), 171-178. doi:10.4236/ce.2012.32027

Justice, C., Rice, J., Roy, D. Hudspith, B. & Jenkins, H. (2009). Inquiry-based learning in higher education: Administrators' perspectives on integrating inquiry pedagogy into the curriculum. *Higher Education.* 58, 841-855. doi:10.1007/s10734-009-9228-7

Kenyon, C. & Hase, S. (2001). Moving from andragogy to heutagogy in vocational education. *Southern Cross University.* Retrieved from http://www.avetra.org.au/abstracts_and_papers_2001/Hase-Kenyon_full.pdf

Keskin, N. & Metcalf, D. (2011). The current perspectives, theories and practices of mobile learning. *The Turkish Online Journal of Educational Technology.* 10(2), 202-208. Retrieved from http://files.eric.ed.gov/fulltext/EJ932239.pdf

Kop, R. (2011). The challenges to connectivist learning on open online networks: Learning experiences during a massive open online course. *The International Review of Research in Open and Distance Learning.* 12(3). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/882

Kop, R. (2012). Cloud computing and creativity: Learning on a massive open online course. *National Research Council of Canada.* Retrieved from http://www.eurodl.org/?p=special&sp=articles&article=457.

Kop, R. & Hill, A. (2008). Connectivism: Learning theory of the future or vestige of the past. *International Review of Research in Open and Distance Learning.* 9(3), 1-13. Retrieved from http://www.irrodl.org/index.php/irrodl/article/viewArticle/523

Lei, S. (2008). Intrinsic and extrinsic motivation: Evaluating benefits and drawbacks from college instructors' perspectives. *Journal of Instructional Psychology*. 37(2), 153-160. Retrieved from http://web.a.ebscohost.com.ezp.waldenulibrary.org/ehost/pdfviewer/pdfviewer

Loertscher, D. (2011). Personal learning environments and PLNs: An introduction. *Teacher Librarian.* 39(2). Retrieved from http://sfxhosted.exlibrisgroup.com/waldenu?url_ver=Z39.88-2004&url_ctx_fmt=infofi/fmt:kev:mtx:ctx&ctx_enc=info:ofi/enc:UTF-8&ctx_ver=Z39.88-2004&rfr_id=info:sid/sfxit.com:azlist&sfx.ignore_date_threshold=1&rft.object_id=962824993223

Mackey, K. & Freyberg, D (2010). The affect of social presence on affective and cognitive learning in an international engineering course taught via distance learning. *Journal of Education Engineering.* 99(1), 23-34. doi:10.1002/j.2168-9830.2010.tb01039.x

Marshall, C. & Rossman, G. (2006). *Designing qualitative research.* Thousand Oaks, Sage.

Marshall, J. & Horton, R. (2010). The relationship of teacher-facilitated, inquiry-based instruction to student higher order thinking. *School Science and Mathematics.* 111(3), 93-101. doi:10.1111/j.1949-8594.2010.00066.x

Maxwell, J. (2013). *Qualitative research design: an interactive approach.* Thousand Oaks, CA: Sage.

McAuley, A., Stewart, B., Siemens, G. & Cormier, D. (2015). *The MOOC model for digital practice.* Retrieved from http://www.elearnspace.org/Articles/MOOC_Final.pdf.

Meta-cognition (1989). In *Oxford English Dictionary* on-line. Retrieved from http://www.bing.com/search?q=define+metacognition&form=PRUSEN&pc=msnHomeST&mkt=en-us&refig=9441b5cd5ec641349708bb0077325f5c&pq=define+metacognition&sc=9-20&sp=-1&qs=n&sk=&cvid=9441b5cd5ec641349708bb0077325f5c

Miller, L., Shell, D., Khandaker, N. & Soh, L. (2011). Teaching using computer games. *Journal of Educational Technology Systems.* 39(3), 321-343. doi:10.2190/ET.39.3.g

Ozan, O. (2013). Scaffolding in connectivist mobile learning environment. *Turkish Online Journal of Distance Education.* 14(2), 44-55. Retrieved from http://files.eric.ed.gov/fulltext/EJ1013746.pdf

Patton, M. (2002). *Qualitative research and evaluation methods.* 3d ed. Thousand Oaks, CA: Sage. ISBN 978-0-7619-1971-1.

Pountney, R., Parr, S., & Whittaker, V. (2002). Communal constructivism and networked learning: reflections on a case study. *Sheffield Hallam University.* Retrieved from http://www.networkedlearningconference.org.uk/past/nlc2002/proceedings/papers/30.htm

Powell, K. & Kalian, C. (2009). Cognitive and social constructivism: developing tools for an effective classroom. *Education.* 130(2), 241-250. Retrieved from http://search.proquest.com/openview/4104a728f3f4a3ec594553ef871dbd54/1?pq-origsite=gscholar

Rajagopal, K., Brinke, D., Van Bruggen, J., & Sloep, P. (2012). Understanding PLNs: their structure, content and the networking skills needed to optimally use them. *First Monday.* 17(1-2), 1-14. doi:10.5210/fm.v17i1.3559

Ravenscroft, A. (2011). Dialogue and connectivism: A new approach to understanding and promoting dialogue-rich networked learning. *International Review of Research in Open and Distance Learning.* 12(3), 139-160. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/934

Richardson, W. and Mancabelli, R. (2011). PLNs: Using the power of connections to transform education. Bloomington, IN: Solution Tree.

Riley, R., Conrad, T., Hatfield, J., Keller-Glaze, H., & Falleson, J (2011). *2011 Center for Army Leadership Survey of Army Leadership: Report of Major Findings.* Fort Leavenworth, KS: Center for Army Leadership.

Rogers, C. (1969). *Freedom to learn: A view of what education might become*. (1st ed.) Columbus, Ohio: Charles Merill

Saadatmand, M. and Kumpulainen, K. (2014). Participants' perceptions of learning and networking in connectivist MOOCs. *Journal of Online Learning and Teaching.* 10(1), 16-30. Retrieved from http://www.researchgate.net/profile/Mohsen_Saadatmand/publication/266327686_Saadatmand_M.__Kumpulainen_K._(2014)._Participants'_Perceptions_of_Learning_and_Networking_in_Connectivist_MOOCs._MERLOT_Journal_of_Online_Learning_and_Teaching_10(1)_16-30/links/553a3b910cf2c415bb0712e7.pdf

Sangra, A. & Wheeler, S. (2013). New informal ways of learning: or are we formalizing the informal. *Universities and Knowledge Society Journal.* 10(1), 286-293. doi:10.7238/rusc.v10i1.1689

Sie, R., Pataraia, N., Boursinou, E., Rajagopal, K., Margaryan, A., Falconer, I., Bitter-Rijpkema, M., Littlejohn, A., & Sloep, P. (2013). Goals, motivation for, and outcomes of personal learning through networks: Results of a tweetstorm. *Educational Technology and Society.* 16(3), 59-75. Retrieved from http://www.ifets.info/journals/16_3/5.pdf

Siemens, G. (2004). Connectivism: A learning theory for the digital age. *eLearnspace.* Retrieved from http://www.elearnspace.org/articles/connectivsim.htm.

Sims, R. (2008). Rethinking (e)learning: A manifesto for connected generations. *Distance Education.* 29(2), 153-164. doi:10.1080/01587910802154954

Singh, P. (2011). Oral assessment: Preparing learners for discourse in communities of practice. *System Practice Action Resolution.* 24, 247-259. doi:10.1007/s11213-010-9184-2

Skiba, D. & Barton, A. (2006). Adapting your teaching to accommodate the net generation of learners. *The Online Journal of Issues in Nursing.* 11(2). doi:10.3912/OJIN.Vol11No02Man04

Snowden, D. (2005). Multi-ontology sense making; a new simplicity in decision making. *Management Today Yearbook,* Havengar, R. ed. (20), 1-13. doi:10.14236/jhi.v13i1.578

Thornburg, D. (2004a). Inquiry: The art of helping students ask good questions. (Executive Briefing No. 402). Retrieved from http://www.tcpdpodcast.org/briefings/inquiry.pdf

Thornburg, D. (2004b). Campfires in cyberpace: Primordial metaphors for learning in the 21st century. Retrieved from http://tcpd.org/thornburg/Handouts/Campfires.pdf

Tinmaz, H. (2012). Social networking websites as an innovation framework for connectivism. *Contemporary Educational Technology.* 3(3), 234-235. Retrieved from at http://www.cedtech.net/articles/33/335.pdf.

Tobin, D. (1998). Corporate learning strategies: Building your PLN. Retrieved from http://www.tobincls.com/learningnetwork.htm.

Trnova, E. & Trna, J. (2012). Connectivism in science education with emphasis on international collaboration. *Journal of Social Sciences.* 8(4), 490-496. doi:10.3844/jssp.2012.490.496

Tschofen, C. & Mackness, J. (2012). Connectivism and dimensions of individual experience. *The International Review of Research in Open and Distance Learning.* 13(1), 124-143. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/1143.

Tu, C-H., Sujo-Montes, L., Yen, C-J., Chan, J-Y., & Blocher, M. (2012). The integration of personal learning environments and open network learning environments. *Techtrends.*56(3), 13-19. doi:10.1007/s11528-012-0571-7

Turner, L. (2014). Developing client-ready practitioners: Learning how to practice national security law at military law schools. *Journal of National Security Law and Policy.* 7(1), 1-80. Retrieved from http://jnslp.com/wp-content/uploads/2014/02/Developing-Client-Ready-Practitioners.pdf

U.S. Army (2002). The training and leader development panel officer study report to the Army. Retrieved from http://www.army.mil/features/ATLD/report.pdf

U.S. Army (2011). *The Army Learning Concept for 2015.* January 20, 2011.

U.S. Army (2012). *ADP 7.0, Training units and developing leaders.* August 2012.

U.S. Army (2013). *Army Leader Development Strategy.*

U.S. Army (2014). *Army Training Support Center Home Page.* Retrieved December 2014 from http://www.atsc.army.mil/atsc/History.asp

U.S. Army (2015). *The DL Star: Distributed learning support training and awareness.* Spring 2015. Retrieved from http://www.atsc.army.mil/tadlp/dlstar/pdfs/DLStar20.pdf

U.S. Army Forces Command (FORSCOM), 2013. *FORSCOM Leader Development Guidance.*

U.S. Constitution, Constitutional Convention, 1787.

Wade, M. (2012). A critique of connectivism as a learning theory. Web log post. Retrieved from http://cybergogue.blogspot.com/2012/05/critique-of-connectivism-as-learning.html

Wayne, H. (2013). Connectivism: Theory or phenomenon? Web log post. Retrieved from http://www.wayneberry.com/blog/?p=702

Wenger, E. (1997). Practice, learning, meaning, identity. *Training.* 34(2), 38-39. Retrieved from http://search.proquest.com/docview/203385613?accountid=14872

Wenger, E., McDermott, R., & Snyder, W. (2002). Cultivating communities of practice: a guide to managing knowledge. Boston, MA: Harvard University Press.

Westera, W. (2011). On the changing nature of learning context: Anticipating the virtual extensions of the world. *Educational Technology and Society.* 14(2), 201-212. Retrieved from http://www.jstor.org/stable/jeductechsoci.14.2.201

Wilson, S. (2008). Patterns of personal learning environments. *Interactive Learning Environments.* 16(1), 17-34. doi:10.1080/10494820701772660

Yin, R. (2009). *Case study research: design and methods.* Thousand Oaks, CA: Sage. ISBN 978-1-4129-6099-1.

Yin, R. (2012). *Applications of case study research.* Thousand Oaks, CA: Sage. ISBN 978-1-4129-8916-9.

Appendix A: Interview and Focus Group Protocols

Interview Protocol

Tour Question: Describe your approach to self-development as a leader in the US Army.

Main Question 1: How would you describe the environment and practice of self-development for leaders in the U.S. Army today?

- **Follow-on question 1.1:** How was your unit's learning environment different between before the employment of PLNs and after?
- **Follow-on question 1.2:** How would you characterize the relative employment of formal and informal leader development within the unit before and after the introduction of PLNs?

Main Question 2: How were you able to employ your PLN in support of your own self-development?

- **Follow-on question 2.1:** What affected your motivation to employ your PLN for your own self-development and your sharing of knowledge with others?
- **Follow-on question 2.2:** What was the effect of Web 2.0 technologies on your learning environment and learning?

Main Question 3: How did your connections to others affect your own learning and your ability to influence the learning of others?

- **Follow-on question 3.1:** What affected your motivation to connect to others in support of your own learning and that of other learners?
- **Follow-on question 3.2:** What was the effect of Web 2.0 technologies

on your ability to curate existing knowledge and develop and share new knowledge? • **Follow-on question 3.3:** How was your ability to construct new knowledge affected by using your PLN and connections to other learners?	
Main Question 4: How did learning through the use of your PLN and your connection to other learners affect the development of your thinking skills? • **Follow-on question 4.1:** Critical thinking skills. • **Follow-on question 4.2:** Creative thinking skills. • **Follow-on question 4.3:** Meta-cognition. • **Follow-on question 4.4:** Problem solving skills.	

Focus Group Protocol

Tour Question: Describe your approach to self-development as a leader in the US Army.	
Main Question 1: How would you describe the environment and practice of self-development for leaders in the U.S. Army today? • **Follow-on question 1.1:** How was your unit's learning environment different between before the employment of PLNs and after? • **Follow-on question 1.2:** How would you characterize the relative employment of formal and informal leader development within the unit before and after the introduction of PLNs?	
Main Question 2: How were you able to employ your PLN in support of your own self-development? • **Follow-on question 2.1:** What affected your motivation to employ your PLN for your own self-development and your sharing of knowledge with others? • **Follow-on question 2.2:** What was the effect of Web 2.0 technologies on your learning environment and learning?	
Main Question 3: How did your connections to others affect your own learning and your ability to influence the learning of others? • **Follow-on question 3.1:** What affected your motivation to connect to others in support of your own learning and that of other learners? • **Follow-on question 3.2:** What was the effect of Web 2.0 technologies on your ability to curate existing knowledge and develop and share	

new knowledge?

- **Follow-on question 3.3:** How was your ability to construct new knowledge affected by using your PLN and connections to other learners?

Main Question 4: How did learning through the use of your PLN and your connection to other learners affect the development of your thinking skills?

- **Follow-on question 4.1:** Critical thinking skills.
- **Follow-on question 4.2:** Creative thinking skills.
- **Follow-on question 4.3:** Meta-cognition.
- **Follow-on question 4.4:** Problem solving skills.

Appendix B: Codes developed during open coding analysis

Code	Meaning
PLN	PLN
Connect	Related to/or example of connectivism
Autonomy	Autonomy in self-development topics and approaches
Connectedness	Connecting to other learners or sources of learning
Diversity	In learners, sources and approaches
Openness	Willingness to share information and ideas
Unit	Unit attitude/support for self-development
Own	Individual's own approach to self-development
AKO	Army existing self-development means
Web	Web technologies for learning
Social	Social media used for self-development
Desire	What respondent wants in/from self-development
Innovation	New idea respondent suggested
Current	Current methods for self-development
Critical	Critical thinking
Creative	Creative thinking
Systems	Systems thinking
Meta	Meta-cognition
Problem	Problem solving
Sources	Sources of learning
Mentor	Mentoring