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A Quantitative Study Examining How Training Enhances Policy Compliance

Therese C. Bensch
Walden University

Walden University

College of Social and Behavioral Sciences

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Therese Bensch

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Review Committee
Dr. Christopher Jones, Committee Chairperson,
Public Policy and Administration Faculty

Dr. David Powell, Committee Member,
Public Policy and Administration Faculty

Dr. Hector Antunez, University Reviewer,
Public Policy and Administration Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
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Abstract

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Therese C. Bensch

MS, Naval Postgraduate School, 1998

BA, University of California, Santa Cruz, 1988

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

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Abstract

For decades, the Department of Defense has been plagued by persistent cost, schedule, and performance problems in defense acquisition programs. Recent changes in Department of Defense acquisition policy were intended to improve efficiency and are demonstrating some improvement in terms of overall cost improvements, yet little is understood about whether training efforts related to the new policies are producing policy-compliant behavior on the job. Using Edgar Schein's "Onion Model" of organizational change as the theoretical construct, the purpose of this study was to examine through an ex post facto, cross-sectional longitudinal study whether there is a significant relationship between learning achieved from Defense Acquisition University (DAU) training in acquisition policy and application of learned policy-compliant behavior, as represented by the variables learning achieved and applied training. Data were obtained from DAU that spanned 19 months and over 334,000 training events separated into 40 course-type subgroups. These data were analyzed through hierarchical regression analysis to test whether concepts learned in policy training predicted policy compliance. The findings confirmed that the independent variable of "learning achieved" is predictive of policy compliance ($p < .001$). Additionally, course types employing transformative active learning and cross-functional team training had statistically significant relationships with the "learning achieved" variable. This study may support positive social change by informing policymakers of the importance of formal acquisition training using transformative training techniques in implementing needed culture change in the defense acquisition workforce, which should lead to better defense acquisition outcomes in support of national security.

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Dedication

This dissertation is dedicated to my mother, Stephanie Hauk. She has been my inspiration, guide, and most valued role model for the strength and leadership she demonstrated through her commitment to serving the common good through nonprofit organizations. She instilled in me her strong values and beliefs centered around honesty, integrity, trust, and humility. She has always given voice to problems and people that were not being heard. Stephanie inspired me to serve in the military and to continue my education in public policy and administration to be a strong leader for positive social change. Thanks Mom!!!

Acknowledgments

My PhD journey would not have been possible without the support of my wonderful family! My poor husband, Bill, was my ever-patient sounding board as I rambled on and on about an ex post facto, longitudinal study design; Cronbach's alpha reliability coefficients; multiple regression assumptions; and transformative training techniques. The man is my hero and a saint! My brilliant and talented sons, Stephen and Joshua, shared their wisdom with me from the prospective of their millennial generation in the information age. I am a digital immigrant and they are digital natives, so their insights into the technology-dominated world in which we live were critical to me in understanding the complexities of our rapidly changing society. My deepest gratitude goes out to all three of you! Thank you!!!

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

For this quantitative research study, I evaluated the nature of the relationship between the Defense Acquisition University's (DAU's) scenario-based training, which emphasizes collaborative teaming, and policy-compliant behavior change in Department of Defense (DoD) acquisition personnel. In Chapter 1, I provide an introduction for the study I conducted in support of my dissertation. I present the background of the problem, along with the study's problem statement; purpose; research question and hypotheses; theoretical framework; nature; definitions; assumptions, delimitations, and limitations; and significance.

Background

In the DoD, defense acquisition policy change is implemented across the acquisition workforce in large part by DAU training to enhance policy understanding and facilitate policy-compliant behavior change in the defense acquisition military and civilian workforce. The DAU provides scenario-based policy training courses, which emphasize transformative, collaborative leadership techniques, as required by U.S. Code Title 10, Section 1746, and in support of the Defense Acquisition Workforce Improvement Act (DAWIA) certification requirements for DoD acquisition workforce personnel (Assistant Secretary of the Navy, 2011; Fishpaw, 2010). There is a large body of literature supporting the need for transformative change in the DoD (Cancian, 2010; Government Accountability Office, 2009c, 2011; Hearing, 2009; Kotzian, 2010; Kratz & Buckingham, 2010; O'Neil, 2011; Tremaine, 2009) and supporting the use of transformational, collaborative leadership techniques in implementing complex change

(Allio, 2010; Masciulli, 2011; Messeri & Richards, 2009; Wentling, 2000); however, strategies designed to implement change in the DoD are not well represented in the literature. My study examined the underresearched topic of organizational change implementation using DAU training of the change-resistant DoD acquisition workforce communities responsible for acquiring national security assets.

My quantitative methodology employed statistical techniques to analyze secondary data collected from DAU postevent and follow-up course survey instruments (Bontis, Hardy, & Mattox, 2011). I conducted multiple regression analyses using IBM Statistical Package for the Social Sciences (SPSS) Statistics 21 to gain a better understanding of the relationship between learning achieved in DAU scenario-based, policy training of cross-functional teams and the ability of students to apply learned policy-compliant behaviors on the job in the DoD. The survey data were collected following DAU training classes, which emphasize transformational, team leadership techniques to enhance effective, flexible, and innovative employment of complex defense acquisition policy critical for adaptive change in a hyperturbulent environment.

Problem Statement

Technological, social, and economic change has led to increased opportunities and challenges, which, in turn, require organizational change. Recent changes in DoD acquisition policy have been designed to enhance effective and efficient use of taxpayer dollars and government resources by requiring increased technological maturity, increasingly stable requirements and funding, cross-functional teaming, systems engineering, and incremental delivery of useful and supportable end items (Under

Secretary of Defense for Acquisition, Technology, and Logistics, 2008). Cost, schedule, and performance problems have persisted in defense acquisition programs since World War II despite repeated attempts at incremental acquisition reform (Kratz & Buckingham, 2010; O'Neil, 2011). After decades of failed attempts at reform, recent DoD policy change implementation efforts are starting to produce some positive outcomes with regard to numbers of programs and costs, according to the 2013 and 2014 Government Accountability Office (GAO) reports on *Defense Acquisitions: Assessments of Selected Major Weapon Programs* (GAO, 2013a, 2014, 2015).

Implementation of complex defense acquisition policy changes driven by funding cuts and program failures is a problem, given the complexity of the processes involved, the hyperturbulent environment, and the change-resistant culture of the DoD acquisition workforce (GAO, 2012). My quantitative study examined the relationship between learning achieved through the DAU acquisition policy training and the acquisition workforce personnel's ability to apply learned policy-compliant behavior on the job. If a positive relationship between training and policy-compliant behavior can be established, then training may be an effective contributor to policy change implementation in the DoD.

Purpose of the Study

The purpose of this quantitative study using ex post facto, cross-sectional and longitudinal survey design was to test the theory that a relationship exists between learning achieved about acquisition policy training and application of learned policy-compliant behavior by the acquisition workforce. My selection of an ex post facto design is supported by Tuckman’s (1999) argument that an ex post facto study design is one in which it is not possible for the researcher to create a treatment to make a variable occur, so the researcher must examine the effects following a naturally occurring treatment. Employing a longitudinal design, I examined participants’ responses at different points in time—in postevent surveys conducted immediately following the course, and in follow-up surveys conducted 60 days after the course (Bontis et al., 2011; Tuckman, 1999). My selection of an ex post facto, cross-sectional and longitudinal survey design was driven by my research question, facilitated useful findings, and was supported by available secondary data.

Research Question and Hypotheses

The literature deficiency identified and the problem statement evoked and established viability of the quantitative research question: To what extent does the Defense Acquisition University’s scenario-based policy training of cross-functional acquisition teams enhance policy-compliant behavior of DoD military and civilian personnel? Application of learned concepts from DAU policy training was the policy-compliant behavior change tested in this study. The null hypothesis was either that the correlation coefficient was equal to zero or that the slope weight was equal to zero, which meant that there was not a correlation, or relationship, between the predictor, *learning achieved* from acquisition policy training, and the outcome, *applied training*, or the ability to apply learned policy-compliant behavior on the job. The research hypothesis provided that there is a significant correlation between *learning achieved* and *applied training* and that *applied training* can be predicted from *learning achieved*.

Theoretical Framework

The theoretical framework that I employed for my dissertation research was Schein's organizational culture and leadership framework; two of his theoretical propositions (i.e., behavior before belief and the need for a temporary cultural island to develop multicultural teams); and his three-stage model of learning/change. Schein's conceptual and theoretical framework bounded the literature review on DoD acquisitions reform efforts, providing structure for a review of the history of defense acquisition reform, type of change needed, style of leadership required for change, acquisition policy changes made, and change implementation efforts. Schein's framework was a good fit for examining the challenges faced by the DoD and the defense acquisition workforce in adapting to a rapidly changing environment.

Schein (2010) argued that environmental change has been accelerated by globalization and technology, requiring transformative, culture change to adapt. Changes in culture, or tacit assumptions, of mature organizations like the DoD cannot, in all likelihood, be successfully implemented and institutionalized directly; however, behavior can be changed by leaders to drive culture change (Burke, 2011; Schein, 2010). The focus of strategic management should, therefore, be on behavior change. Systematic thinking is required for analysis of complex interdependencies, and cross-cultural teaming inclusive of diverse perspectives is critical to successfully addressing the complexities of the turbulent external environment (Schein, 2010). Schein (2010) posited that multicultural integration requires a psychologically safe, temporary cultural island, which can be provided in an educational setting appropriate for new learning. Crises and scandals can be undeniable, disconfirming events that can start the self-assessment and change processes (Schein, 2010).

The three phases of Schein's (2010) change model—unfreeze, cognitive restructuring, and internalize—were applied to and expanded for the DoD change implementation process. The DAU can teach acquisition policy, but the DAU cannot make acquisition professionals learn new policy-compliant behaviors or apply these learned behaviors on the job. This study tested for predictors of both learning new concepts and applying these new concepts in the defense acquisition workplace. Therefore, an expanded culture change model that included applying learned behavior provided the framework for this research.

The literature review showed that the elements that Schein identified as requirements for successful organizational culture change (systematic thinking and multicultural teaming) are captured in the DoD policy changes, that change is being driven by funding crises, and that policy changes are being introduced to the acquisition workforce in psychologically safe educational settings. Therefore, I was able to show that the DoD's strategic management of defense acquisition policy changes is closely aligned with Schein's theoretical framework for successful organizational behavior change, which should lead to needed culture change consistent with DoD policy. This study tested whether a relationship exists between DoD policy training and policy-compliant behavior change.

Nature of the Study

An ex post facto, cross-sectional and longitudinal research design was selected for my study to facilitate useful findings. A quantitative survey methodology employed secondary data from available, reliable survey instruments to measure the study variables. The DAU survey instruments use a 7-point Likert scale, with participants responding to statements such as “I learned new knowledge and skills” on a scale from 7 (*strongly agree*) to 1 (*strongly disagree*; Bontis et al., 2011). Statistical data analysis allowed me to infer whether a relationship between variables existed and allowed for generalization about the larger defense acquisition population.

The secondary data collected and maintained by the DAU supported data analysis that was designed to generate results that are representative of and can be generalized to the defense acquisition workforce population of approximately 150,000 military and civilian personnel (DAU, 2011; GAO, 2012). All acquisition personnel are required to attend DAU career-field-specific certification training (Fishpaw, 2010). Eligible study participants were defense acquisition workforce members who responded to DAU online surveys following training events between 1 January 2014 and 31 July 2015.

The large DAU dataset was divided into 40 subset samples broken out by postevent or follow-up survey type, and for the covariates, delivery type and functional topic. The expanded four-stage culture change model drove the selection of the outcome variables, *learning achieved* and *applied training*. For the *learning achieved* outcome, the potential predictors selected for multiple regression analysis were *career benefit*, *worthwhile investment*, *exercises value*, *examples helped*, *instructor enthusiasm*, *application discussed*, *instructor knowledge*, *delivery effective*, and *graphics meaningful*. For the *applied training* outcome, the potential predictors selected for multiple regression analysis were *learning achieved*, *task applicability*, *resources provided*, and *manager involvement* (Bontis et al., 2011; DAU, n.d.).

The statistical method of control for my study was simple and multiple regression. I used simple and multiple regression analyses of variables in the Acquisition (ACQ) Instructor Led Training (ILT) and Self-Paced Web (SPW) samples to determine the covariates with the greatest effect sizes and, therefore, the greatest potential to be predictors of the outcomes, *learning achieved* and *applied training*. I divided the DAU data sample into subgroups to remove biasing inequality by computing relationship measures for internally homogeneous groups within each biasing factor (Frankfort-Nachmias & Nachmias, 2008). If a nonspurious relationship was found, then the null hypothesis was rejected, and the conditions under which this relationship existed were elaborated.

Multiple regression was used to describe the extent of linear relationships between the dependent variable and a number of independent variables and covariates. I used multiple regression to test the simultaneous effect of my independent variables and covariates on the dependent variable, *learning achieved*. This method of control was also used to test the extent of the relationship between my independent and covariates, to include *learning achieved*, on *applied training*, which was the dependent variable (research hypothesis). By holding the other variables constant, multiple regression made it possible to assess the extent of the change in a dependent variable caused by an independent variable (Frankfort-Nachmias & Nachmias, 2008). The use of a quantitative approach using study methodology and employing stratified random sampling of defense acquisition workforce members who had completed DAU courses allowed for useful results that can be generalized to the population being studied.

Definitions

In this section, I define the independent variable, dependent variable, and covariates. I also define terms used in the study that have multiple meanings or are defense acquisition jargon.

Definitions of Study Variables

My quantitative methodology employed secondary data collected previously by the DAU using online survey instruments with a 7-point Likert scale to measure the variables being tested in this study. The survey results provided numerical rating data and student comments that supported the research design. The DAU secondary data contain information that can be measured at ordinal (greater than) and interval (fixed interval) levels (Bontis et al., 2011). The four-stage culture change model drove the selection of the outcome variables, *learning achieved* and *applied training*, for this study.

For the *learning achieved* outcome, the potential predictors selected for multiple regression analysis were *career benefit*, *worthwhile investment*, *exercises value*, *examples helped*, *instructor enthusiasm*, *application discussed*, *instructor knowledge*, *delivery effective*, and *graphics meaningful*. The DAU postevent survey data files contain the seven independent (predictor) variables and the dependent (outcome) variable required to calculate the multiple regression. The outcome, *learning achieved*, was operationalized by the statement “I learned new knowledge and skills.”

The predictor, *career benefit*, was operationalized by the statement “I will benefit from what I learned in the course for my career/professional development.” The predictor, *worthwhile investment*, was operationalized by the statement “this training was a worthwhile investment for my employer.” The predictor, *exercises value*, was operationalized by the statement “the exercises added value to my learning.” The predictor, *examples helped*, was operationalized by the statement “the examples presented helped me understand the content.” The predictor, *instructor enthusiasm*, was operationalized by the statement “the instructor’s energy and enthusiasm kept the participants actively engaged.” The predictor, *application discussed*, was operationalized by the statement “on-the-job application of each class objective was discussed during the course.”

The predictor, *instructor knowledge*, was operationalized by the statement “the instructor was knowledgeable about the subject.” The predictor, *delivery effective*, was operationalized by the statement “this delivery method was an effective way for me to learn the material.” The predictor, *graphics meaningful*, was operationalized by the statement “the graphics and illustrations used were meaningful and within context.” The units for all the variables were Likert-scale scores from 7 (*strongly agree*) to 1 (*strongly disagree*).

For the *applied training* outcome, the potential predictors selected for multiple regression analysis were *learning achieved*, *task applicability*, *resources provided*, and *manager involvement*. The DAU follow-up survey data files contained the four independent (predictor) variables and the dependent (outcome) variable required to calculate the multiple regression. The outcome, *applied training*, was operationalized by the statement “I have been able to successfully apply the knowledge/skills learned in this class to my job.”

The predictor *learning achieved* was operationalized by the statement, “I learned new knowledge and skills from this training.” The predictor *task applicability* was operationalized by the question “what percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?” The predictor *resources provided* was operationalized by the statement “I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.” The predictor *manager involvement* was operationalized by the statement “after training, my manager and I discussed how I will use the learning on my job.” The units for all the variables, except *task applicability*, were Likert-scale scores from 7 (*strongly agree*) to 1 (*strongly disagree*). The *task applicability* units were percentages.

To show that a condition or contingency is necessary for the relationship between the independent and dependent variables to occur, I examined whether the relative size or direction of this relationship is more pronounced in covariate subgroups (Frankfort-Nachmias & Nachmias, 2008). The two training delivery type covariates are instructor led training (ILT) and self-paced web training (SPW). The 10 functional course topic covariates provide required training for the major defense acquisition functional certifications and included acquisition (ACQ); business, cost estimating, and financial management (BCF); contract management (CM); contracting (CON); engineering (ENG); logistics (LOG); program management (PMT); production, quality and manufacturing (PQM); science and technology management (STM); and test and evaluation (TST).

Definitions of Study-Specific Terminology

Acquisition: The process of conceptualizing, designing, developing, testing, contracting, producing, deploying, logistically supporting, modifying, and disposing of weapons and other systems, supplies, or services to meet defense capability requirements (Hagan, 2009).

Acquisition environment: Internal and external factors that affect defense acquisition programs and can include factors such as politics, policies, regulations, funding requirements instability, and crises (Hagan, 2009).

Acquisition logistics: Management activities designed to meet user supportability requirements, such as reliability, maintainability, availability, transportability, spares, training, and training and maintenance manuals that must be considered from the beginning and throughout the acquisition life cycle to minimize costs of supporting the fielded system (Hagan, 2009).

Acquisition management: Management of all acquisition activities, training of the defense acquisition workforce, provision of support to acquisition user communities, and the planning, programming, budgeting, and execution (PPBE) process for defense acquisition programs (Hagan, 2009).

Acquisition of services: Advisory and assistance services to DoD activities provided by private-sector entities (Under Secretary of Defense for Acquisition, Technology, and Logistics (USD [AT&L]), 2008).

Acquisition program: A funded effort in response to validated DoD requirements that provides new, improved, or continuing systems or services capabilities (Deputy Secretary of Defense, 2007).

Appropriation: Congressional authority for federal agencies to incur obligations and expend funding from the Treasury (Hagan, 2009).

Capability: The ability to achieve a desired effect under given conditions as defined by an operational user and expressed in broad operational terms (Chairman of the Joint Chiefs of Staff [CJCS], 2012).

Contracting: A process that leads to an economic exchange between government and private industry, in which the government aligns public needs and values to market conditions (Brown, Potoski, & Van Slyke, 2006).

Contracting officer: An individual with the authority to initiate, administer, and terminate contracts for the U.S. government (Hagan, 2009).

Contractor: A private-industry organization that enters into contractual agreements with the DoD to provide products or services (Hagan, 2009).

Cost estimate: The predicted dollar cost of acquiring items or tasks as determined by an estimating procedure (Hagan, 2009).

Cost growth: The net change of a dollar amount over the originally estimated amount established for the program, task, or product (Hagan, 2009).

Cost overrun: The amount of funding over the estimated cost of a contract incurred by the contractor (Hagan, 2009).

Cost risk: The risk that approved cost objectives will not be met by the acquisition program (Hagan, 2009).

Culture: There are multiple definitions of culture. Schein's (2010) seminal work on organizational culture is employed as a framework for this study; therefore, I use Schein's definition of culture, which is the following:

> A pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. (p. 18)

Defense Acquisition Management System (DAMS): The life cycle of an defense acquisition program consists of milestones, or decision points, and five phases: Materiel Solution Analysis (MSA), Technology Maturation and Risk Reduction (TMRR), Engineering and Manufacturing Development (EMD), Production and Deployment (P&D), and Operations and Support (O&S; Deputy Secretary of Defense, 2007).

Defense Acquisition System: A DoD management process used to provide materiel solutions to meet user capability needs in an effective, affordable, and timely manner (Deputy Secretary of Defense, 2007).

Defense Acquisition University (DAU): Mandated by Title 10, U.S.C. § 1746 and DoD Directive 5000.57, the DAU provides the defense acquisition workforce with basic, intermediate, and advanced training aligned with DoD policy and mission assistance designed to enhance decision making, business acumen, and timely and affordable capability outcomes (Hagan, 2009).

Defense industry: Private-sector contractors that provide goods and services to the DoD (Hagan, 2009).

Deploy/Deployment: Putting an acquired system into operational use with units in the field/fleet (Hagan, 2009).

DoD Directive (DoDD) 5000.01, The Defense Acquisition System: The principal DoD acquisition policy directive applicable to DoD acquisition programs (Hagan, 2009).

DoD Instruction (DoDI) 5000.02, Operation of the Defense Acquisition System: Provides an acquisition framework/process for translating user requirements and technological opportunities into materiel solutions provided by an affordable and responsive acquisition program (Hagan, 2009).

End item: The completed product ready for issue or fielding (Hagan, 2009).

Evolutionary acquisition (EA): An incremental strategy that allows for more rapid acquisition of mature technologies that are militarily useful and supportable, while less mature technologies are further developed for delivery in future increments (USD [AT&L], 2013).

Execution: The running of a defense acquisition program in accordance with its approved budget (Hagan, 2009).

Federal Acquisition Regulation (FAR): The regulation that governs federal executive agencies in the acquisition of goods and services with appropriated funding (Hagan, 2009).

Fiscal year (FY): The 12-month period of October 1 through September 30 (Hagan, 2009).

Funding profile: Funding appropriated and authorized for program execution that is typically provided in a spreadsheet-type document by years, starting from the previous year and extending through the out years (Hagan, 2009).

Government Accountability Office (GAO): A legislative branch agency that reports to Congress on its findings from audits of government contracts and investigations into how public funds are received, disbursed, and applied (Hagan, 2009).

Increment: A useful and supportable military capability that can be developed, produced, deployed, and sustained as part of an evolutionary acquisition approach made up of multiple increments designed to deliver technology as it matures to address a DoD capability gap (Hagan, 2009).

Information Technology: System or subsystem used to acquire, store, manipulate, manage, transfer, display, transmit, or receive data or information (CJCS, 2012b).

Integrated product team (IPT): A product-focused team composed of representatives from appropriate functional disciplines chartered to enhance the likelihood of program success, identify and resolve programmatic issues, manage risk, and make recommendations to decision makers (Hagan, 2009).

Joint Capabilities Integration and Development System (JCIDS): Implements the requirements process, which supports the Chairman of the Joint Chiefs of Staff (CJCS) and the Joint Requirements Oversight Council (JROC) in identification, assessment, and prioritization of joint military capability needs (CJCS, 2012a).

Life cycle cost (LCC): Consists of research, development, testing, evaluation, procurement, operation, support, and disposal costs over the system's life cycle (DAU, 2014).

Life cycle management (LCM): A management approach that is used throughout the life of systems, which ensures that programmatic decisions are based on economic and mission-related benefits derived over systems' life cycles (Hagan, 2009).

Life cycle: All phases of the system's life, including materiel solution analysis (MSA), technology maturation and risk reduction (TMRR), engineering and manufacturing development (EMD), production and deployment (P&D), and operations and support (O&S) through disposal (Hagan, 2009).

Knowledge-based acquisition: A management approach that requires adequate knowledge and understanding at critical programmatic decision points throughout the acquisition process to support informed decision making (Hagan, 2009).

Major Defense Acquisition Programs (MDAPs): A program estimated to require funding expenditures over the following thresholds: $365M for research, development, test, and evaluation (RDT&E) and $2.19B for procurement, or those programs designated by USD(AT&L) to be MDAPs (Hagan, 2009).

Materiel: Equipment and supplies used by an organization to meet mission requirements (Hagan, 2009).

Materiel solution: An end product that corrects a deficiency in military capability or incorporates new technology that results in the acquisition and deployment of a new system or subsystem (CJCS, 2012b).

Militarily useful capability: An operationally effective, affordable, suitable, available, sustainable, and interoperable capability that meets mission objectives (CJCS, 2012a).

National debt: The amount owed by the U.S. federal government, which includes debt held by investors outside the federal government and intragovernmental debt held by government accounts that invest surplus funds in Treasury securities (Hagan, 2009).

National Security Strategy: Provides overarching U.S. national security goals and objectives (Hagan, 2009).

Operational requirements: Validated defense needs that address mission capability gaps/deficiencies, changing threats, emerging technologies, or affordability improvements and are provided in requirements documents, such as the Capability Development Document (CDD) and the Capability Production Document (CPD), which inform the acquisition process (Hagan, 2009).

Planning, Programming, Budgeting, and Execution (PPBE) Process: The DoD's formal, systematic resource allocation process that supports decision making on strategic policy, as well as force and capabilities development in support of mission accomplishment (Hagan, 2009).

Procurement: The buying of goods and services (Hagan, 2009).

Procuring contracting officer: The government individual authorized to enter into and manage government contracts with industry for products and services (Hagan, 2009).

Products: Systems, subsystems, supplies, data, software, etc. acquired for use by the DoD (Hagan, 2009).

Program: A defined and funded effort to acquire a new or improved capability in response to a stated mission need or deficiency (Hagan, 2009).

Program instability: The condition under which a program is unable to maintain planned cost, schedule, and performance objectives due to problems or changes in requirements, technology, and/or funding (Hagan, 2009).

Program management: The centralized managerial process used throughout the life cycle of a system in which a program manager plans, organizes, staffs, controls, and leads the efforts of a military and/or civilian team in the management of a defense acquisition program (Hagan, 2009).

Program manager (PM): Designated individual with responsibility for and authority to accomplish program objectives for development, production, and sustainment of a capability to meet DoD operational needs (DoD, 2007)

Program stability: A condition in which a program is experiencing few perturbations in cost, schedule, and performance due to business or technical problems or changes in requirements or funding (Hagan, 2009).

Reprogramming: Realignment of budget authority for funding from the appropriated purpose to finance another requirement, which allows for funding flexibility when executing defense programs (DoD, 2011).

Requirement: The documented and specific need for equipment, services, personnel, facilities, or other resources to address a capability gap or exploit emerging technology (Hagan, 2009).

Requirements creep: Changes, typically made by the user, in system performance requirements while the system is still in development (Hagan, 2009).

Risk: A measure of future uncertainties in achieving program performance goals and objectives within defined cost, schedule, and performance constraints (Hagan, 2009).

Risk management: A management process that focuses on identifying, analyzing, and mitigating root causes and consequences of risk (DoD, 2006).

Selected Acquisition Report (SAR): Standard status report to Congress for a Major Defense Acquisition Program (MDAP), which includes cost, schedule, and technical information (Hagan, 2009).

Stove pipes: Subcultures based on similar organizational experiences, education, occupations, geographical location, or functions of the group members (Schein, 2010).

Strategic planning: The deliberative, disciplined effort to produce fundamental decisions and actions that shape and guide an organization’s response to challenges driven by a dynamic environment (Bryson, 2011).

Strategy implementation: The communication, interpretation, and enactment of strategic plans (Bryson, 2011).

System: A combination of interrelated equipment packaged to provide operational capability to meet user requirements (Hagan, 2009).

System deployment: Delivery of a militarily useful system to the end user (Hagan, 2009).

Systems effectiveness: A measure of how well a system should achieve specific mission requirements in terms of capability, reliability, availability, and dependability (Hagan, 2009).

Systems engineering: The process applied across the acquisition life cycle to go from a stated capability needs to an operationally effective and suitable system, which addresses capability requirements, design considerations, and limitations of technology, budget, and schedule (DAU, 2014).

Tailoring: Common-sense changes to the acquisition regulatory processes authorized by the Milestone Decision Authority (MDA) to increase the likelihood of program success and to minimize the time required to meet stated capability needs (Hagan, 2009).

Total Ownership Cost (TOC): A metric that determines the design, development, production, operations, and support costs of DoD systems, which includes the directly attributed LCC and other related business process or infrastructure costs not specifically attributable to the program (DAU, 2014).

Trade-off: Alternative selection to best balance cost, schedule, performance, and risk to acquire the optimal, achievable system configuration that meets the users' requirements (Hagan, 2009).

United States Code (U.S.C.): A consolidated document of U.S. laws that govern the Armed Forces (Hagan, 2009).

User: An operational command or agency that has need of and will employ the system acquired (CJSC, 2012a).

Weapon system: Items required by the Armed Forces to meet combat mission objectives (Hagan, 2009).

Assumptions, Delimitations, and Limitations

An initial assumption was that the survey instruments used to collect DAU secondary data support reaction and behavior change analyses appropriate for my study (Defense Acquisition University, n.d.). A second assumption was that the Bontis et al. (2011) determination of the validity and reliability of the survey instruments would hold true for a similar data set using the same measurement instruments. Delimitations, or bounds, of the study included the examination of policy-compliant behavioral change following DAU training of the defense acquisition workforce personnel population only. A limitation of using an instrument that was not designed specifically to answer my research question was that I could not change the survey to better ensure that I measured what I intend to measure. This concept is known as *validity* (Frankfort-Nachmias & Nachmias, 2008). The possibility that study outcomes were influenced by other factors caused internal validity concerns, which needed to be mitigated. The study findings are generalizable to the defense acquisition workforce population.

Significance

My study was unique because it examined the underresearched topic of policy change implementation in the defense acquisition workforce responsible for acquiring national security assets in a highly turbulent environment (Bontis et al., 2011). The results of this study add to the literature discussion concerning the relationship between the DAU's scenario-based training approach emphasizing transformational, cross-functional teaming techniques and acquisition policy-compliant behavior of the change-resistant population studied. An opportunity for social change was presented by studying the effectiveness of scenario-based training emphasizing cross-functional teaming to enhance policy-compliant behavior that may lead to greater effectiveness and efficiency of the acquisition community, whose members are stewards of both taxpayer dollars and warfighter material solutions.

Summary

In Chapter *1*, I have provided an introduction for a proposed study for my dissertation, which has included the background of the problem; problem statement; purpose of the study; research question and hypotheses; theoretical framework; nature of the study; definitions; assumptions, delimitations, and limitations; and significance of the study. My study, using a quantitative survey methodology, evaluated whether a relationship exists between DAU scenario-based training that emphasizes cross-functional teaming and policy-compliant behavior change in the defense acquisition workforce following training. My selection of an ex post facto, cross-sectional and longitudinal design was driven by my research question, facilitated useful findings, and was supported by available secondary data.

The Chapter 2 literature review identifies a knowledge gap, supporting the research topic, study significance, framework, and variables described in Chapter 1. Chapter 3 provides the methodology and design most appropriate for addressing the research problem identified in Chapter 1 and supported by Chapter 2. These chapters address the identified research problem and how this study filled a gap in the literature

(Walden University, 2009). Chapter 4 provides the analysis and findings of the study conducted to address the research problem identified in the earlier chapters. Chapter 5 provides study implications, recommendations, and the ways in which the study extends knowledge in the discipline by comparing the findings with what was found in the Chapter 2 literature review.

Chapter 2: Literature Review

In Chapter 2, I provide a review of relevant and current scholarly resources related to my topic of study. The introduction to this chapter includes a description of the literature review content, the organization of the review around key ideas, and the literature search strategies. Research and literature related to the problem statement are summarized. I compare differing viewpoints and research outcomes and discuss the relationship of my study to previous research. This literature review supports the study's theoretical and conceptual framework and the descriptions of the variables being investigated. The methodology approach appropriate to the study is also explored.

Implementation of complex defense acquisition policy changes, driven by funding cuts and program failures, is a problem because of the complexity of the processes involved and the change-resistant culture of the DoD Acquisition, Technology, and Logistics (AT&L) workforce (GAO, 2012), which is referred to as the *acquisition workforce* in this dissertation. The purpose of this quantitative study using an ex post facto, cross-sectional and longitudinal survey design was to test whether or not a relationship exists between *learning achieved* in acquisition policy training and application of learned policy-compliant behavior by the acquisition workforce in the DoD workplace. To address the problem of implementing required strategic change in defense acquisition, I conducted a quantitative study of cross-sectional and longitudinal survey results to test whether a relationship exists between learning achieved in DAU scenario-based policy training courses for cross-functional defense acquisition personnel and the ability to apply the learned policy-compliant behavior on the job.

A corporate university for the DoD, the DAU provides training required by the Defense Acquisition Workforce Improvement Act (DAWIA) for certification as a DoD acquisition professional (Fishpaw, 2010; Kotzian, 2010). DAWIA identifies, by career field and certification level, the education, training, and experience requirements that DoD acquisition workforce members must achieve to progress over time within the DoD (DAU, 2008; Kotzian, 2010). The DAU provides the training required by acquisition workforce members for each of 15 different career fields leading to Level I through Level III certification and additional tailored training, as required (DAU, 2010; Kotzian, 2010). The DoD needs to ensure that all personnel responsible for delivering defense products and services are prepared to do so in a cost-effective and timely manner (Kotzian, 2010). The DAU training curriculum is designed to enhance understanding of acquisition policy and encourage adult learners to apply existing functional knowledge and skills to develop solutions to complex acquisition scenarios to better understand and apply new defense acquisition policies as cross-functional team members in the DoD workplace (DAU, n.d.).

There is a large body of literature that describes persistent defense acquisition issues impacting national security and government spending in a rapidly changing environment (Cancian, 2010; GAO, 2009c, 2011; Hearing, 2009; Kotzian, 2010; Kratz & Buckingham, 2010; O’Neil, 2011; Tremaine, 2009); defense acquisition policy changes required to adapt to the DoD’s dynamic external environment (Fishpaw, 2010; GAO, 2010; Hofbauer, Sanders, Ellman, & Morrow, 2011; Redshaw, 2010); the need for behavior change before belief when implementing required DoD cultural change (Burke, 2011; Eide & Allen, 2012; GAO, 2012a, 2012b; Schein, 2010); the use of collaborative leadership techniques to facilitate behavioral change required to enhance the likelihood of successful implementation of complex policy changes (Bass & Riggio, 2010; Boyne & Walker, 2010; Hackman, 2010; Kotzian, 2010; Masciulli, 2011; Messeri & Richards, 2009; van Eeden, Cilliers, & van Deventer, 2008); and the need for metrics to establish acquisition policy implementation effectiveness (Bontis, Hardy, & Mattox, 2011; GAO, 2011b, 2011d, 2013b; Hickman, 2010; Nissen, 2012; Wentling, 2000). Although formal training is identified as having the greatest potential impact on the acquisition workforce in terms of numbers (Kotzian, 2010; Tremaine, 2009) and DAU training provides significantly better *learning achieved* and *applied training* results than other corporate universities (Bontis et al., 2011), the literature does not address the effectiveness of formal training in creating change in terms of application of learned policy-compliant behavior in the acquisition career fields. My research addressed this DoD policy change implementation gap in the literature by examining whether DAU collaborative team training enhances policy-compliant behavior required for policy change implementation. In Chapter 2, I provide my literature search strategy, conceptual and theoretical framework, literature review related to key variables and concepts, and summary and conclusions from the literature review.

Literature Search Strategy

I conducted a literature review of current peer-reviewed journal articles, books, and seminal works that informed my dissertation, which addresses the research that explores whether defense acquisition training enhances policy-compliant behavior.

Change implementation employing training techniques is a multidisciplinary topic, so I used the Walden University research databases that covered the subject areas of public policy and administration, management and business, education, and behavioral studies and psychology. Specific Walden University databases that were searched included Business Source Complete/Premier, Political Science (SAGE), Military and Government Collection, SocINDEX, Expanded Academic ASAP, CQ Researcher, PsycARTICLES, ERIC, Education (SAGE), Science Direct, Academic Search Complete/Premier, PolicyFile, and ProQuest Central. I also conducted searches online using Google Scholar. Ulrich's Periodicals Directory was used to determine the peer-reviewed/refereed status of the journals containing relevant articles. The Walden University Library databases and Google Scholar were searched for peer-reviewed literature published after 2008 using the key search terms: *DoD acquisition*, *defense acquisition*, *defense acquisition policy*, *acquisition policy reform*, *acquisition research*, *transformational leadership*, *collaborative teaming*, *acquisition culture*, *cultural change*, *Defense Acquisition University*, *secondary data*, and *Likert scale*.

For each study reviewed, I critiqued strengths, limitations, and research design; this review guided my development of the research design for my dissertation effort. The articles critiqued provided a background understanding of my theoretical framework, the importance of a transformational approach to adaptive change in a rapidly changing environment, difficulties in transforming culture, ongoing defense acquisition policy reform efforts, sampling and analysis of secondary data sets, and the DAU's survey instruments using the Likert scale and existing secondary data. Except as noted, each of the articles reviewed provided comprehensive reviews of the literature with appropriate citations from current sources, clear definitions, a nonbiased approach, validity and reliability (as appropriate), and evidence supporting the survey design's appropriateness to address the topic presented (Yob, 2010).

Theoretical Foundation

Theory was used deductively to provide the basis for the research and a framework in which to relate relevant variables in the study (Creswell, 2009). The theoretical framework that I employed for my dissertation research was Schein's organizational culture and leadership framework; specifically, I used two of his theoretical concepts, (a) behavior before belief and (b) need for a temporary cultural island to develop multicultural teams, as well as and an expanded version of his three-stage model of learning/change. In this section, I describe Schein's explanation of why organizational change is required and what is needed to change organizational culture. Throughout the remainder of the chapter, I provide the supporting and contrasting arguments of other authors on cultural change. I also compare the defense acquisition policy changes made by Congress and the DoD since 2008 to Schein's guidance for cultural change. This comparison shows that defense acquisition policies align well with Schein's framework for organizational change, which narrows the study focus to implementation of the policies. If the policies are well designed to attain organizational culture change but the culture does not change, then the implementation of the policies needs to be assessed. Culture change is very difficult to measure, so policy-training-induced behavioral change that should lead to cultural change was measured in this study.

Schein's Organizational Culture and Leadership Framework

Rapidly increasing technological complexities unique to the information age make the need to access and adapt organizational culture critical to providing public value in government organizations. In his seminal work on organizational culture, Schein (2010) defined *culture* as follows:

> A pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. (p. 18)

A product of social learning, culture is a stabilizing force that defines group identity, makes sense of the world, and avoids the anxiety that comes with chaos. Culture is a set of deeply held assumptions that are often unconscious and have a pervasive influence on all of the group's functions. Although cultural manifestations are visible, culture is not visible and is, therefore, difficult to access and change. Early in the organization's life cycle, leaders create cultures, but as organizations mature, their cultures create and define their leaders, and the likelihood that leaders can change culture declines. Shared cultural norms guide and constrain the behaviors of members of an organization. Schein (2010) emphasized the need for behavioral change to drive transformation of organizational culture.

Schein's (2010) framework describes three levels of culture: artifacts, espoused beliefs and values, and basic underlying assumptions. *Artifacts* include visible processes and observable behavior. *Espoused beliefs and values* include goals, aspirations, ideals, ideologies, and rationales. *Basic underlying assumptions* include tacit beliefs and values that drive behaviors and perceptions. To achieve cultural change, the tacit assumptions on which the culture is founded must be changed, which is difficult, time consuming, and anxiety provoking (Schein, 2010). A leader must be capable of understanding and changing the assumptive framework of the organization to manage the culture in order to adapt to changing environments. It is far more difficult to embed new assumptions in mature organizations than in young, growing organizations.

The literature supports a broad acceptance of Schein's three-levels-of-culture framework; however, researchers disagree on which level (artifacts, beliefs and values, or underlying assumptions) most accurately represents an organization's culture (Christensen & Gordon, 1999; Harris & Ogbonna, 2011; Kilmann, Saxton, & Serpa, 1985). Schein (2010) argued that underlying assumptions reflect culture and that artifacts, behaviors, and values are manifestations of that culture. However, Christensen and Gordon (1999) and Kilmann, Saxton, and Serpa (1985) argued that any of the three levels can adequately represent an organization's culture. Kilmann et al. (1985) conceptualized cultural change at the behavioral level, while Kunda (1995) and Willmott (1993) argued that tacit assumptions and values most accurately reflect the culture that guides behavior. My study employed Schein's conceptualization of culture represented by tacit assumptions and his theory that behavior changes can lead to changes in underlying assumptions and beliefs.

Cultural learning takes place as organizations face two major issues: external adaptation for survival and internal integration. Schein (2010) contended that the problems of external adaptation should be addressed using strategic management techniques that develop consensus on a shared mission and strategy, goals, the means to attain the goals, the measurement criteria for use in determining whether the goals are being met, and correction strategies for use if the goals are not met. He argued that the problems of internal integration should be addressed by developing a common language and concepts to facilitate communication; determining membership criteria for inclusion and exclusion; establishing rules for power, authority, and status distribution; developing relationship norms to address acceptance and intimacy; establishing rules for reward and punishment allocations; and giving meaning to unexplainable events to avoid anxiety. Cultural learning involves both effective problem solving when addressing external survival issues and anxiety avoidance when addressing internal integration issues (Schein, 2010).

Evolutionary change in organizational culture happens naturally in response to external environment changes; however, rapid changes in the environment create disequilibria that force transformational change, which challenges deeper cultural assumptions. Schein (2010) argued that "once a culture exists, once an organization has had some period of success and stability, the culture cannot be changed directly unless the group itself is dismantled" (p. 312). This does not bode well for culture change in a large, old organization like the DoD, in which dismantling of the organization is not a viable option. However, Schein argued that culture change can be launched by behavior change. Changes in behavior that result in better outcomes will encourage personnel to reexamine their beliefs and assumptions and lead them to adopt new beliefs and assumptions. Behavior can be changed by DoD leaders, which can start the process of culture change. Culture change is always transformative (Schein, 2010).

As organizations mature, subcultures are created by shared assumptions that often form in organizational units. *Stove pipes* are subcultures based on similar organizational experiences, education, occupations, geographical location, or functions of group members. In this study, integration of defense acquisition functional subcultures was examined. Cross-functional team members have difficulty integrating different functional cultures to work together, communicate, reach consensus, and implement decisions effectively. Schein (2010) explained that organizational subcultures must align well with each other, because each of the functional areas is required to meet the organization's mission. The literature supports Schein's argument that exploiting diversity increases an organization's capacity to adapt (Levine, 2003; Selden & Selden, 2001; Stevens, Plaut, & Sanchez-Burks, 2010; Wentling, 2000).

Globalization and information technology have accelerated environmental change, requiring greater organizational responsiveness and adaptability and creating new cultural challenges. Schein (2010) argued that as the world becomes more fast paced, complex, and culturally diverse, organizations must increase the diversity of work units by developing units such as multicultural teams, multicultural joint ventures and partnerships, and multicultural networks. As knowledge and skills become more dispersed, leaders must come to terms with their own lack of expertise and depend on others to develop solutions to increasingly complex problems.

Control-oriented organizations like the DoD may thrive in stable environments, but their lack of flexibility and adaptability will cause them to fail as global and technological trends increase the complexity of problem solving (Schein, 2010). Diversity is a critical resource for coping in an unpredictable environment, which means that individuals from different subcultures must ensure cross-cultural communication and understanding. Also important is a commitment to thinking systematically, which allows analysis of complex interdependencies and joint causal effects. In an environment that is becoming more turbulent, perpetual learning is critical to responsiveness and adaptation, yet it is in conflict with the strong stabilizing force of culture that makes things meaningful and predictable and reduces anxiety.

Schein (2010) posited that learning about other cultures in a *temporary cultural island* must happen before multicultural collaborations can be successful. A cultural island is a psychologically safe situation in which the rules of social order have been suspended to create a climate of neutrality, allow for exploration of values and assumptions, and enhance empathy and communication. In the DoD, educational settings are used to provide this psychologically safe situation and establish a common frame of reference to guide behavior. If new behavior is learned and can be successfully applied in support of problem solving and crisis resolution, new shared cultural assumptions should develop (Schein, 2010). Although other researchers did not directly support Schein's concept of cultural islands, the literature did support the concept that formal socialization, as provided by educational interventions, may increase values conformity and improve an organization’s ability to achieve strategic adaptation (Harris & Ogbonna, 2011; Jaeger & Baliga, 1985; Jones, 1986).

An examination of practices, norms, and tacit assumptions can be forced by public scandals and crises (Schein, 2010). Scandals and crises, like program failures and funding cuts experienced by the DoD, can be powerful disconfirming events that are undeniable and can start the self-assessment and change processes. Although scandals provide the conditions necessary to implement new practices and values, they can only become new cultural elements if the new practices and values produce improved outcomes. If a scandal makes conscious the organization’s underlying assumptions and the assumptions are assessed as dysfunctional, choices for change may include destruction of the organization or a transformational change of the dysfunctional parts of the culture to enhance organizational adaptability (Schein, 2010). Cancian (2010) and Hofbauer, Sanders, Ellman, and Morrow (2011) found that the DoD’s perpetual acquisition scandals have led only to continuous reform without sufficient positive outcomes. However, GAO findings from the 2013, 2014, and 2015 annual assessments of selected major weapon programs show some improvements in defense acquisition outcomes over the results from the previous 10-years of GAO assessments (GAO, 2013a, 2014, 2015).

Schein (2010) explained that transformational leadership will be required to unfreeze the organization and start the process of developing new cultural assumptions. The leaders must teach, coach, and change processes and structure where needed; reward learning new ways of doing things; develop new stories, rituals, and slogans; and coerce organizational members by any means to take on new behaviors that will enhance the likelihood of turnaround success. In mature organizations, like the DoD, dysfunctional cultural elements can only be changed through drastic processes driven by crises or scandals that lead to total restructuring or turnarounds.

Schein's Three-Stage Model of Learning/Change

Schein (2010) provided an expanded conceptual three-stage model of learning/change that was derived from Lewin's (1947) change model. The first stage of cultural change is unfreezing the organization by creating the motivation to change. Creating motivation to change is accomplished by disconfirming and unlearning dysfunctional assumptions and behaviors, building survival anxiety, and reducing learning anxiety by creating psychological safety and an understanding that a new way is possible. For example, learning anxiety may arise when the new learning involves transforming competitive relationships into collaboration and team work (Schein, 2010). To create the conditions necessary for transformative change, learning anxiety must be reduced and be less than survival anxiety.

The second stage of cultural change is cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards (Schein, 2010). Once an organization has been unfrozen, cognitive restructuring can come through new learning based on trial and error or role model identification and imitation. The third stage of cultural change is refreezing, or internalizing the new concepts, meanings, and standards by incorporating them into the organization's identity and relationships. If the new behaviors learned correct problems and produce better outcomes, the new learning should stabilize, be internalized as new tacit assumptions, and eventually lead to cultural change (Schein, 2010).

Previous Application of Schein's Theoretical Framework

Schaubroeck et al. (2012) used Schein's foundational organizational culture framework, focusing on culture-embedding mechanisms and shared cultural elements. The researchers extended Schein's theoretical framework using quantitative survey methodology to develop and test a model relating leadership, culture, and their effects on the ethical cognitions and behaviors of followers. Participants included 2,572 U.S. Army soldiers from three organizational levels. Schaubroeck et al. (2012) found limited support for direct flow-down mechanisms of ethical leadership and broad support for their multilevel model that reflects how leaders influenced and embedded shared cultural understandings at lower organizational levels, which influenced ethical cognitions and behaviors of the followers.

Al-Onizat's (2012) quantitative study used Schein's framework to focus on learning organizations to examine the relation between the learning organization and intellectual capital. The researcher conducted correlation and regression analysis on data from the major Jordanian banks in an emerging economy and a dynamic technological environment. The participants were 2010 Jordanian bank employees. The findings support Al-Onizat's (2012) hypothesis that learning organizations positively impact intellectual capital in Jordanian banks. These results extend Schein's theory of organizational learning to include creating intellectual capital in Jordanian banks.

The theoretical framework used in Eide and Allen's (2012) study combined Schein's seminal work on and definition of organizational culture, emphasizing the need for behavioral change to drive cultural change, and Kotter's (1996) theoretical proposition that there are eight primary reasons why implementation of change efforts fail. The combined theoretical framework was used to assess the likelihood of successful defense acquisition reform. Eide and Allen (2012) argued that the DoD has been trying to correct acquisition process problems for over 60 years. Their study followed up on Hanks, Axelband, Lindsay, Malik, and Steele (2005) findings that the DoD has significant cultural and structural impediments that constrain the ability of the defense acquisition process to deliver desired outputs.

Eide and Allen (2012) emphasized the importance of the embedded expectations and assumptions of senior leadership on followers' ethical conduct. Common mistakes in implementing transformational change, which include complacency/resistance, setbacks/obstacles, and empowerment, can slow or halt the change process and create follower resistance and frustration. Globalization, driven by technological, social, and economic change, is increasing opportunities and challenges that require organizational change. The change process unfreezes the status quo then introduces and institutionalizes change. Eide and Allen (2012) support Schein (2010) and Kotter's (1996) argument that implementation efforts that change behavior have an increased likelihood of success. Applying this framework to their analysis of current acquisition change initiatives, they concluded that the DoD acquisition initiatives will likely fail unless behavior change of the defense acquisition workforce is achieved to embed the leadership actions and institutional processes that will drive culture change. Eide and Allen (2012) argued that without culture change, “one can expect to repeat the history of unfulfilled mandates for reform” (p. 101).

Linn’s (2008) study used Schein’s (1985) definition of organizational culture to focus his review of the literature on organizational culture and cultural change challenges when implementing library change initiatives. Organizational culture is made up of the values and beliefs of its members, so it is difficult to define, measure, and change. Linn (2008) argued that organizational culture is the last to change when implementing organizational change. The likelihood of successful implementation is increased by ensuring alignment of the change being implemented with the cultural beliefs of the organization. Change can create unexpected consequences, so cultural understanding is critical to determining how best to implement needed change (Linn, 2008).

Boin and Christensen’s (2008) study used qualitative, case study methodology to build on Schein’s organizational culture and leadership framework by developing a 5-phase model, called the norm cycle, for further study of leadership’s facilitative role in institutionalization processes. The five phases included the development of effective practice; emergence of a norm; acceptance of the norm; embedding the norm in organization policy, operational routines, training, control mechanisms, selection, retention, and promotion; and legitimizing the norm by aligning it with the cultural values of its environment (Boin & Christensen, 2008). These authors explain that it is difficult for organizations to effectively serve “multiple, complex, and mutually exclusive goals in a volatile environment that is characterized by impatient politicians, scrutinizing media, critical citizens, and scarce resources" (Boin & Christensen, 2008, p. 271). This study supports Schein's theory by arguing that behavior change in the form of practicing new concepts and methods comes before internalizing and institutionalizing the new concepts and methods.

Present Study's Rationale for Building on Schein's Framework

My theoretical framework incorporated Schein's conceptual framework, his three-stage model of learning/change, and his theoretical posits that behavior change launches culture change and that psychological safety is required for the multicultural learning needed to respond to a rapidly changing environment. This framework guided the focus of the research to test whether a relationship exists between effective learning of acquisition policy concepts in DAU scenario-based, policy training courses for cross-functional defense acquisition personnel and the ability to apply the learned policy-compliant behavior on-the-job. Formal DAU training provides a psychologically safe environment and creates the motivation to change (Stage 1 of Schein's model). This training facilitates learning new concepts, meanings, and standards (Stage 2) aligned with defense acquisition policy that should lead to changed behavior when applying the new concepts, meanings, and standards in the DoD workplace. If the new behavior enhances outcomes, the new concepts, meanings, and standards aligned with defense acquisition policy should eventually be internalized (Stage 3) and lead to needed culture change in the defense acquisition workforce. My research focused on the participants' ability to apply learned acquisition policy concepts gained in Stage 2 to create the behavior change needed to start the Stage 3 process of internalization.

Literature Review Related to Key Variables and Concepts

Defense Acquisition Problems Drive Need for Change

The DoD is the U.S. government's largest purchasing organization (Government Accountability Office, 2011d), spending over $400 billion annually on acquisition of products and services (Defense Business Board, 2011; GAO, 2010a). The Government Accountability Office (GAO, 2009a) argued that the propensity for Congress and the DoD to start more acquisition programs than the government can afford, creates competition for funding between acquisition programs. The issues of low cost estimating and optimistic scheduling encouraged by extensive competition for limited funding resources leads to defense acquisition programs that are consistently over-budget and behind schedule, which in turn leads to low stakeholder confidence in defense program management capabilities (GAO, 2009a, 2009c).

The DoD's substantial investment in military capabilities represents over 70 percent of total government spending on contracts, which makes it crucial for the DoD to ensure that government interests are met (GAO, 2010f). Skilled and mindful management of weapon systems and complex service acquisitions throughout all phases of the acquisition process is required for achievement of successful outcomes. The GAO (2009a) reports that the DoD management of acquisition programs has been inadequate and resulted in major defense acquisition program outcomes that continue to experience cost overruns and schedule delays while delivering less quantities and capabilities than planned. Cancian (2010) argued "our weapon systems acquisition process is a perpetual scandal" (p. 391). Hofbauer, Sanders, Ellman, and Morrow (2011) supported Cancian's

(2010) conclusion, stating "because the acquisition process has been a perpetual scandal, efforts at reform have been continuous" (p. 399).

In 2010, the 98 major acquisition programs in the DoD’s portfolio had a cumulative cost growth of $402 billion and an average schedule delay in delivering needed warfighter capabilities of 22 months (Hofbauer, Sanders, Ellman, & Morrow, 2011). The GAO (2010d) also reported that the DoD’s poor management of service contracts was a causal factor in spending growth more than doubling since 2001, which has contributed to cost overruns, schedule delays, and unmet performance expectations. Management failure was the culmination of thousands of individual reactive decisions that were not aligned with the DoD’s strategic plans and policies.

Due to an increasingly dynamic global environment, Kratz and Buckingham (2010) argue that the U.S. needs a responsive, cost-efficient acquisition process to develop and maintain military capability. Although the DoD’s defense acquisition policies have undergone major reforms over the past 60 years (Kratz & Buckingham, 2010) and have been designated by the GAO as high-risk for 20 years, defense acquisition reform efforts have had limited impact, repeatedly failing to overcome resistance to the policy changes designed to address outcome problems and the underlying causes (GAO, 2009b; GAO, 2010a). Congressional and the DoD reform efforts since 2008 have provided laws and defense acquisition policy changes that emphasize increased knowledge and discipline that should enhance the DoD’s ability to manage government acquisition, estimate program costs, and align requirements and resources early in the acquisition process prior to becoming a program of record, because it costs far less to fix problems early in the acquisition design and development process than late in development or production (GAO, 2010a).

The GAO (2010a) argued that defense acquisition reform cannot succeed without the right personnel with the right skill sets to manage and execute complex acquisition programs throughout the defense acquisition process. Although there is risk in every program, unnecessary risk assumed by acquisition personnel at any point in the acquisition process can increase the likelihood of poor outcomes. For example, a poor systems design or acquisition plan can doom a program from the start, while a poor choice of contracts or an inadequately staffed and trained acquisition workforce can decrease the DoD’s ability to manage and execute the acquisition effort through to successful delivery of required capabilities. Outcome success is predicated on many things, while a poor outcome may be the result of only one source of poorly managed risk (GAO, 2010a). A tough fiscal environment and changing operational requirements drives the need to enhance efficiency and effectiveness of the defense systems acquisition and contract management (GAO, 2009a).

Kratz and Buckingham (2010) argued that the U.S. is facing a constrained fiscal environment that will continue to decrease defense budgets for the foreseeable future. Increases in military operational tempo have increased fiscal pressures and strained the federal budget due to increasing numbers of priorities, making it more important than ever for the DoD to effectively and efficiently manage the country’s significant investment in military systems. If money is wasted due to inefficient defense acquisitions of military systems, then fewer dollars are available to meet other important budgetary requirements (GAO, 2009a).

Hofbauer et al. (2011) studied 92 active major acquisition programs and 12 cancelled programs to identify root causes of cost overruns and schedule delays. Their results strongly correlate inaccurate cost estimates with net cost growth. Poor cost estimates were associated with 40 percent of the accumulated cost overruns. Hofbauer et al. explained that for each of these programs it was obvious in retrospect that developing and producing the required capability was not possible for the cost estimated at the start of the program. The greater the uncertainty early in the program, the higher the risk of underestimating the program cost. True system costs are locked in early when critical capabilities are designed into the system, but these true costs do not become apparent until the system matures and the extent of the development, production, and support challenges are fully understood (Hofbauer et al., 2011). Accurate cost estimates are important in supporting good decision-making and decreasing cost-growth that reduces quantities delivered, stretches schedules, and decreases available funding for other government priorities.

The GAO (2009a) has identified strategic and program level causes for DoD cost, schedule, and performance problems in defense acquisition programs. The DoD's strategic investment strategy is made up of fragmented processes for identifying requirements, allocating funding, and developing and procuring military systems, which do not effectively balance competing service requirements and lead to more programs started than can be resourced (GAO, 2009a; Hofbauer et al., 2011). Balancing the DoD's entire defense acquisitions portfolio against available defense funding should enhance program affordability assessments and decrease the number and size of acquisition programs (GAO, 2010e). The GAO (2010e) reported that problems at the program level are the result of starting development without a clear understanding of the military need to be met and the resources required to meet the need. Poor outcomes can be the result of inadequate systems engineering early in the program, overly optimistic cost estimates, underfunding, changing requirements, and a lack of leadership accountability (GAO, 2009a).

To address these acquisition problems, the DoD made changes in 2008 and in 2015 to its defense acquisition policy, DoD Instruction 5000.02, to enhance knowledge-based acquisition by requiring additional systems engineering, earlier oversight reviews, competitive prototyping, and review boards to oversee any requirements changes (Under Secretary of Defense for Acquisition, Technology, and Logistics, 2008, 2015; GAO, 2009a). In 2009, President Obama and Secretary of Defense Gates argued that these dramatic changes in defense acquisition were needed in order to maintain U.S. military superiority in an environment of shrinking economic resources (Eide & Allen, 2012).

Gates (2010) spoke of Eisenhower’s “passionate belief that the U.S. should spend as much as necessary on national defense, but not one penny more” (para. 16). In May 2009, Congress passed the Weapon Systems Acquisition Reform Act (WSARA, or Reform Act), requiring changes that aligned well with the 2008 DoD 5000.02 policy changes (Eide & Allen, 2012). This legislation was designed to further improve outcomes by focusing on early acquisition efforts, improving systems engineering, holding preliminary design reviews earlier in the acquisition process, and strengthening independent cost estimates and technology readiness assessments (Weapon Systems, 2009; GAO, 2009a). In 2010, the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD [AT&L], 2010) disseminated further implementation guidance in his Better Buying Power initiatives.

Hofbauer et al. (2011) explained that the Reform Act and policy change guidance can by categorized as rhetorical, reporting, acquisition strategies focused, and enhancing program fundamentals. Rhetorical change focused on encouraging contractors to work more efficiently by setting target goals for improvement. Policy changes increasing reporting requirements can be bureaucratically burdensome, but reporting can decrease surprises by alerting decision-makers of problems to facilitate restructuring or termination earlier in the program (Hofbauer et al., 2011). Acquisition strategy changes adopted early in the process to reduce risk and avoid cost-growth include funding and requirements stability, technology maturation, and contract incentives. Policy changes that focus on program fundamentals include earlier, more accurate cost estimation to support good decision-making early in the acquisition process when more options are possible; starting fewer programs within the available budget to allow for inevitable cost growth; and, requiring cost, schedule, and performance tradeoffs when developing requirements (Hofbauer et al., 2011).

These policy changes are a good first step in addressing the issue of consistently poor acquisition outcomes, but the GAO (2009a) asserted that the DoD must also translate policy into practice and ensure that policy changes result in outcomes that meet warfighter needs. The policy changes are important to the DoD’s ability to more effectively manage rising acquisition costs. From 2009 through 2011, acquisition costs rose by $135 billion for 98 major defense programs (GAO, 2011a). A capable acquisition workforce is key to controlling costs and meeting warfighter needs in a rapidly changing environment in which increasing requirements and budget cuts are a reality (GAO, 2011d). To gain change implementation momentum, program decisions must be consistent with policy reforms (GAO, 2010d).

In response to policy changes, the DoD made strengthening the size and capability of the acquisition workforce a strategic priority. In 2010, the DoD converted acquisition-related contractor positions to government positions and used the Congressionally-allocated Defense Acquisition Development Workforce Fund to hire roughly 5,900 civilians into the acquisition workforce. Although budget constraints have curtailed plans for further workforce growth, the GAO (2011d) argued that enhancing the skills and expertise of the acquisition workforce is as important as increasing the workforce size. Legislative and policy changes highlighted the importance of acquisition training to enhance required acquisition workforce skill sets (GAO, 2011a). The GAO (2011a, 2011d) also argued that the DoD must do more than measure the workforce size. The DoD needs to develop additional metrics to determine whether its acquisition training is effective in improving acquisition outcomes and to justify funding levels needed to support policy change implementation (GAO 2011a, 2011d). The GAO (2010f) report pointed out that cultural barriers may limit the effectiveness of policy change implementation in the DoD.

Although technology, design, and manufacturing improvements have been noted, the GAO (2010b) has continued to report that most major defense acquisition programs are proceeding through the acquisition process with less programmatic knowledge on the part of the acquisition workforce than required under new policy guidance, which increases risk of cost overruns and schedule delays. Workforce inadequacies, requirements changes, funding shortfalls, and technical development problems persist and make programs difficult to execute (GAO, 2010b). The GAO (2010b) argued that if the DoD is successful in implementing recent policy changes requiring greater knowledge-based acquisition then defense acquisition outcomes should improve.

The DoD typically accepts that its weapon systems will cost more, take longer, and deliver reduced capabilities and quantities than originally planned (GAO, 2010a). Acquisition and budgeting processes have in the past accommodated poor acquisition outcomes; however, the accommodating environment changed due to Congressional decisions to cancel programs, such as the VH-71 Presidential Helicopter, the Armed Reconnaissance Helicopter, the Expeditionary Fighting Vehicle, the Transformational Satellite, and portions of the Future Combat System (GAO, 2010a). Although the latest acquisition reforms for the DoD are promising, the GAO (2010a) is unsure if they will break the cycle of poor defense acquisition outcomes.

Tremaine (2009) argued that the DoD policy changes have provided appropriate guidance for DAWIA implementation designed to enhance workforce effectiveness in managing and implementing defense acquisition programs. Evolutionary training transformation over the past eighteen years has strengthened the individual functional acquisition areas of expertise, which should allow the acquisition workforce to meet today's acquisition challenges. However due to rapidly increasing technical complexities, acquisition programs continue to face challenges in delivering sufficient acquisition outcomes (Tremaine, 2009).

Complex, Rapid Environmental Changes Drive Need for Culture Change

In the 19th and 20th centuries, a major shift in paradigm occurred as organizational structures of the Industrial Age shifted to a power structure based on office and gender (Clawson, 2012). In the late 20th and 21st centuries, another paradigm shift to the Information Age occurred that is being driven by dynamic technology advances providing extensive information access and a requirement for increased responsiveness in this complex environment. The bureaucratic organizational structure successful in the Industrial Age is not responsive enough to compete in this dynamic environment and is giving way to organizational power structures based on cross-functional teams of key personnel closest to the problems being addressed (Clawson, 2012). Successful change in organizational structures in order to adapt and survive in the information age requires that a leader gain the trust and willingness of the people at the working level (Macklem, 2006). The bureaucratic leader's centralized, control mentality is outdated and ineffective in a world in which extensive amounts of information are readily available to personnel at every rank (Clawson, 2012).

Due to complexities of the high-technology Information Age, it is increasingly important for leaders to recognize and employ the talents and contributions that other people provide in support of their visions. Extensive information access and a requirement for increased responsiveness in this dynamic environment have led to bureaucratic organizational structures that are not responsive enough to adapt. No one person can possess all necessary knowledge, so organizational power structures are shifting to cross-functional teams of key personnel (Clawson, 2012). These teams of experts are the ones who will drive the compelling visions for future success in the information age.

Pearce and Conger (2010) argued that leadership techniques have evolved in response to the evolution of the predominant organizational work efforts from manual labor to high technology professions. These changes in how work is performed, response speed, and complexity drive the evolution of leadership techniques and strengths for successful application (Pearce & Conger, 2010). As with the evolution of life, the most successful adaptations survive until the environment significantly changes (Burke, 2011).

Masciulli (2011) provided a comprehensive review of literature on public leadership in a complex and rapidly changing environment. To solve increasingly complex technical, economic, and social problems, Masciulli argued that collaborative strategies employing ethical leadership by teams of political, technology, and scientific leaders is required. Masciulli found that effective change strategies emphasized networking, diversity, and technological interoperable to address global and regional problems. He provided that transformational leadership employing teams of political and techno-scientific experts will enhance the possibility of successful change implementation and facilitate organizational survival in a globalized environment.

While the concept of transformative, team leadership discussed by Masciulli is broadly supported by the literature for successful change implementation, directive, participative, and team leadership techniques have been successfully employed by defense acquisition leaders. All three techniques continue to have utility when applied in appropriate circumstances (Pearce & Conger, 2010). Directive leadership, in which communication flow is top-down, is reactive to change and is most effective when quick decisions are required in support of crisis situations, such as combat. Participative leadership, in which team member input is considered in decision-making, is collaborative in nature and effectively supports groups tasked with clear goals, such as development of an acquisition strategy. Team leadership is proactive in nature establishing team cohesiveness through a common purpose, goals and work effort; provides cross-functional expertise; allows the team to make decisions; and is most effective when addressing complex efforts, such as weapons system development (Masciulli, 2011; Pearce & Conger, 2010). Each of these leadership techniques have evolved in successful response to the environment and can be effectively employed depending on the circumstances, the individual personalities, and skill sets involved. Pearce and Conger (2010) asserted that in a fast-changing and complex world, cross-functional team leadership is significantly more effective than traditional, top-down leadership, because senior leaders may not have adequate and relevant information for effective decision-making; response speed is increased when leadership is shared across organizations; and increasing complexity means that senior leadership will be less likely to possess the skills and knowledge to guide complex organizations.

Allio (2010) argued for enhancing innovation to support organizations struggling for survival as the trends of slow growth, information overload, and increasing diversity continue following the latest economic recession. He encouraged leaders to create alliances outside of the organization to gain innovative resources and to overcome internal resistance to changes in the status quo. Gathering and employing stakeholder ideas can lead to breakthroughs in innovation not possible from within the organizational structure and culture (Allio, 2010).

Beattie, Thornton, Laden and Brackett (2013) argued that culture is a stabilizing force that promotes continuation of the status quo. In their article on change efforts in higher education, Beattie et al. (2013) found many planned organizational change efforts fell short of their intended goals and were unable to successfully implement sustained change. Leaders tend to take on leadership roles without the needed training and experience that would enable them to foresee and address unintended outcomes caused by their decisions. Unintended consequences result as leaders promote change in response to crises, such as those caused by budget reductions (Beattie, Thornton, Laden, & Brackett, 2013). Leaders must address the outcomes of unintended consequences appropriately, because these outcomes can have a significant impact on the success or failure of planned change. The need to implement new policies for this higher education organization was driven by reductions in funding and changing stakeholder expectations. Beattie et al. (2013) argued that these new policies attempt to address immediate requirements, but fail to address systemic issues and root causes.

Edison and Murphy's (2012) study employed a quantitative methodology to examine respondent perceptions of the impact of 15 DoD product support change implementation factors. Some of these factors are perceived by respondents as enablers that assist in implementing change, while other factors are perceived as barriers that work against change implementations. The participants included 300 defense acquisition workforce members. This study focused on implementing policy changes for product development and support. The researchers addressed the need to deliver performance-based product support that is more cost effective and efficient than the transactional, spares and repairs product support most commonly used in the DoD. The findings indicated that the highest ranked barrier to effective change implementation was institutional cultural paradigms. Edison and Murphy's study supported the need for defense acquisition culture change and recommended that old assumptions be replaced "with new ideals and expectations associated with letting the old paradigm go. These include replacing perfectionist ways of thinking with experimental thinking, and getting-it-just-right credos with making-it-better credos" (p. 383). Their argument that culture is the most difficult factor to overcome when implementing change is strongly supported by the literature (Burke, 2011; Linn, 2008; Schein, 2010; Yukl, 2010). The second highest ranked barrier to change was found to be funding (Edison & Murphy, 2012). These results fit with my literature review findings that cultural change is needed in the DoD to address fiscal crises in a rapidly changing and complex environment (Beattie et al., 2013; GAO, 2012b; Hofbauer, Sanders, Ellman, & Morrow, 2011).

Edison and Murphy's (2012) study also found that formal training was perceived to enable effective change implementation. They explained that a lack of training had been perceived as a barrier to change implementation in a 2005 study and was perceived as an enabler in their study, which indicated improvement in the impact of training on implementing needed change; however, additional focus on training development and outcomes are needed to further enable change implementation. Edison and Murphy argued that training should be employed as the primary enabler to addressing cultural change implementation in the defense acquisition workforce. The cultural paradigms factor found to be the major change barrier should be addressed in training of all acquisition personnel to convey clear understanding of the required change and why it is important; what the cultural change impediments are and how to remove them; and stories of successful change implementation that highlight enhanced acquisition outcomes in support of mission requirements (Edison & Murphy, 2012).

Strategic Management for Adaptation and Integration

Strategic management includes strategic planning and implementation. It is a necessary tool to facilitate success in a rapidly changing world. Strategic planning allows government agencies to identify legitimate, politically sustainable goals that can be managed and delivered effectively (Poister, 2010). Public organizations must provide efficient, effective, and equitable services that meet the expectations of citizens to achieve high standards on a variety of dimensions of performance (Boyne & Walker, 2010). In the public sector, strategic planning improves or redefines performance, driven by a few critical strategies, to meet emergent external challenges and identifies strategies for achieving required results. Poister (2010) argued,

> Public agencies are best served by "nimble" strategic planning systems that focus very selectively on identifying and resolving the most compelling issues facing them as they continue to monitor internal and external conditions and scan the environment to discern emerging issues that might require new strategic responses. (p. S252)

Strategic planning provides a direction for collaborative efforts, focuses those efforts on identified goals, and facilitates successful implementation across the organization (Boyne & Walker, 2010). Tailoring strategic planning to meet the needs of the public agency is critical to successful implementation of the strategic plan. Boyne and Walker (2010) explained that strategic management enhances organizational performance by matching their internal capacities with their external environment. Brown (2010) argued that the strategic planning effort in the public sector would enhance effective decision making and guide behavior to achieve desired goals. Public sector strategic planning is important to foresee challenges imposed by a changing environment, establish a vision and goals to meet those challenges, and manage for results.

Sharp and Brock's (2011) study used qualitative, case study methodology to identify enabling mechanisms to overcome change resistance when implementing strategic change in nonprofit organizations. These organizations have values-oriented, mission focuses that are strongly incorporated into their identities and tend to resist strategic change. They found that mechanisms that enhanced implementation success were: compensatory participation, which broadened participation in implementing the strategic plan; evolutionary implementation, which allowed the organization to adapt overtime; and, organizational interpretation, which encouraged a participatory approach to interpret and modify the plan. The case study provided an in-depth look at how best to implement change for the organization studied in a relatively stable environment and provided a theoretical proposition that supported aligning change with the existing culture to enhance the likelihood of change implementation success. The study weakness is that the findings cannot be generalized to other organizations or environmental situations.

Harris's (2011) study also employed qualitative, case study methodology that provided an understanding that successful implementation of a strategic plan must account for the relationship between organizational identity and strategy in nonprofit organizations. The study findings showed that it is important to develop flexible strategic plans that align with organizational identity, which is crafted according to the context and the stakeholders involved (Harris, 2011). Although this study cannot be generalized to other organizations, the concept of the strategy needing to be aligned with organizational identity (a facet of culture) echoes Sharp and Brock's (2011) and Linn's (2008) findings that the likelihood of successful implementation is increased by ensuring alignment of the change being implemented with the cultural beliefs of the organization.

Andrews, Boyne, Law, and Walker's (2011) study employed quantitative survey methodology. Their findings indicated that there is no implementation style that by itself enhances performance. These findings support the broader literature and suggest that the alignment of strategy and internal (cultural) characteristics enhance implementation and, in turn, organizational performance. Although an in depth understanding of the topic studied is not provided using survey methodology, the findings can be generalized to similar organizations.

There are many benefits to be gained by implementing the DoD’s comprehensive strategic plan. In an increasingly constrained fiscal environment, one benefit of strategic management is to ensure that DoD resources are used effectively by focusing resources on key priorities (Free Management Library, n.d.). Strategic planning is the deliberate and disciplined effort to make fundamental decisions and take actions that guide the DoD’s response to challenges driven by a rapidly changing environment in which budgets are decreasing and the requirements are increasing (Bryson, 2011).

Another important benefit of DoD strategic management is the development of a baseline for progress measurement and a mechanism for change, as needed (Free Management Library, n.d.). Light and Kettl argued that “change ... is the rule, rather than the exception” (Bryson, 2011, p. 4). To meet its mission requirements, the DoD must measure progress of initiatives to change processes to ensure that the actions taken when implementing the strategic plan effectively adapt the organization to changing mission needs and budgetary constraints (Free Management Library, n.d.).

Internal factors impacting successful strategic management. The DoD’s mission is to provide the military forces needed to deter war and to protect the security of the United States (U.S. Department of Defense [DoD], n.d.). The DoD manages the U.S. Armed Forces and other government agencies and functions that directly support national security. The DoD's Strategic Management Plan (SMP) provided that the strategic goals include: "Prevail in today's wars, prevent and deter conflict, prepare to defeat adversaries and succeed in a wide range of contingencies, preserve and enhance the all-volunteer force, and reform the business and support functions of the Defense enterprise" (DoD, 2011, pp. 1-2). The SMP further described seven DoD business goals, which include strengthen and right-size the DoD total workforce; strengthen DoD financial management; build agile and secure information technology capabilities; increase the buying power of the DoD; increase energy efficiency; re-engineer and use end-to-end business processes; and, create agile business operations that support contingency missions (DoD, 2011). The defense acquisition workforce is directly responsible for the strategic business goals of building information technology capabilities, increasing DoD buying power, and increasing energy efficiency of new and fielded systems. Acquisition personnel will also be impacted by or involved in meeting the DoD's strategic goals of strengthening and right-sizing the DoD workforce and strengthening financial management and business processes (USD [AT&L], 2010).

Examples of DoD internal environmental aspects that negatively impact the organization's ability to meet its strategic management goals are a centralized power structure, limited transformational leadership, and a stove-piped culture (GAO, 2012b). The DoD must be able to adapt in a rapidly changing fiscal environment to meet national security needs in a relevant and cost effective manner. The DoD's internal environment should be taken into accounted to enhance the likelihood of successful strategic planning (Moynihan, 2006).

Moynihan (2006) provided that a decentralized organizational structure tends to be more flexible in responding to changing environments. The DoD has a centralized power structure that does not readily adapt to necessary changes (GAO, 2012b). The top-down flow of communication in the DoD limits collaboration between military branches and geographical regions, making strategic planning and implementation difficult. To overcome this obstacle, the DoD culture would need to allow for increased managerial authority to facilitate greater flexibility and responsiveness at all levels.

Task oriented, transactional leadership styles are more common in the DoD than the transformational leadership styles needed for strategic change implementation (Burke, 2011). Challenging the status-quo is unusual, because the DoD’s leadership tends to be highly risk adverse. Transformational leadership in the DoD is critical to successfully implement strategic planning and change. Although transactional leadership is critical to day-to-day operations, the DoD culture should support the development of transformational change agents to articulate the vision of change throughout the organization (Burke, 2011).

Organizational culture is an aspect of the DoD’s internal environment that is important to take into account when conducting strategic planning. Deep-seated values and beliefs drive the behavior of DoD personnel in accomplishing tasks (Burke, 2011). The DoD’s stove-piped culture is broken down into the multiple military branches. Successful strategic planning will require that disconnections be identified and cooperation and collaboration between the services be enhanced to bring the DoD organization together. Identifying and overcoming internal obstacles will increase the likelihood of successful strategic planning and implementation in the DoD.

Crisis presents opportunities for adaptive change and enhances the likelihood of successfully implementing public policies that may be considered “unthinkable or simply politically infeasible in normal times” (Bion, 2008, p. 289). Leadership can be effectively used as a tool to explore and instigate new ways of working and organizing to implement public policy changes. The importance of leadership as a policy implementation tool has not changed; however, leadership techniques continue to evolve in response to the evolution of the predominant organizational work efforts from manual labor to high technology professions (Herman, 2000). These changes in how work is performed, response speeds, and increasing complexity all drive the evolution of leadership techniques required for successful change implementation (Pearce & Conger, 2010).

Defense Spending Debate and Fiscal Crises

The fiscal crises driving the DoD’s need for transformative change stem from long-standing debates on U.S. spending policies, deficit spending that is not fiscally sustainable, and political ramifications of deficit reduction. Defense spending by the federal government is a policy debate rooted in the tensions addressed during the country’s founding between the need to create a unified nation and the citizens’ aversion to a centralized political power (Ellis, 2000). The Constitution provided the basis for maintaining a common defense capability; however, administering a federal defense force in light of these ongoing tensions is difficult and leads to heated defense spending policy debates. The defense spending debates are fueled in part by these tensions between our constitutional obligation to provide for the common defense and Americans' fear of abuses by big government.

The National Conference of State Legislatures (2013) explained that the federal government collects 60 cents of revenue for every $1 expended, which leads to an ever-increasing deficit. For the past four years, the federal deficit has been driven up over $1 trillion to greater than $16 trillion due to unfunded and underfunded policy decisions, such as wars in Iraq and Afghanistan, Medicare Part D, stimulus, and bailouts, coupled with decreased economic growth and shortfalls in revenue following tax cuts in 2001, 2003, and 2010 (National Conference of State Legislatures, 2013). Over time, government spending of more than the revenues it receives is not fiscally sustainable and may lead to a lower standard of living for future generations who must pay for the services provided in the past (Mikesell, 2011).

By reducing outlays and increasing receipts the federal deficit can be reduced; however, the politics of increasing taxes and reducing spending on public benefits are difficult due to objections made by those impacted (Mikesell, 2011). The U.S. has a long history of running federal deficits with no severe consequences, such as an extensive economic depression or hyperinflation. These factors make running deficits easier politically than balancing the federal budget. Large federal deficits can reduce long-term economic growth as each generation finds that much of its federal resources are already committed. Domestic standards of living will also be reduced by servicing federal debt that is increasingly held outside of the U.S. economy (Mikesell, 2011). While federal deficit spending has been a valuable tool in enhancing economic growth and productivity, managing and controlling the federal deficit to ensure that the costs do not outweigh the benefits for future generations has led to significant budget cuts impacting the DoD. Partisan politics that encourage congressional members to vote along party lines create additional difficulties in addressing fiscal problems by making it hard for members of different parties to work together to develop and pass legislation that provides effective policies and policy implementation (Chiou & Rothenberg, 2003; Lee, 2013). The inability of government leadership to work together to make consistent policy decisions on defense requirements and budgets has created problems for the DoD in implementing needed change (GAO, 2010c, 2012b).

This lack of collaboration between congressional members and the president leads to indecision and inconsistent guidance that causes turbulence in program execution, because the DoD has no control over when the budget gets approved, the amount of funding appropriated by Congress, or the Total Obligation Authority (TOA) available in the budget (GAO, 2008). As long as partisan politics demand that members vote along party lines, it will be difficult for members of different parties to work together to develop and pass legislation that provide effective defense policies that will allow for consistent policy implementation in the DoD.

Lee (2013) used qualitative, case study methodology to better understand the declining enactment of environmental legislation over the past 20 years. The author argued that legislative standstills in U.S. politics have been caused in great part by institutional gridlock, or conflicts among elected officials. The findings suggest that bureaucratic politics may be another cause for the recent environmental legislative standstill. This qualitative study cannot be generalized to other organizations or types of legislation; however, the findings offer an interesting perspective on the important impacts of the conflict brokering by bureaucratic organizations between conflicting stakeholders in causing legislative standstills. Although the argument seems counter-intuitive, Lee (2013) explained that the organization studied has increased its brokerage efforts over the past 25 years, engaging in successful mediation among policy stakeholders. The collaborative efforts have decreased needed conflict expansion around the topics being legislated, which, surprisingly, has created additional legislative standstills (Lee, 2013). Collaborative efforts for effective change are widely supported by the literature; however, Lee points out that not all collaborative efforts are effective in producing needed change.

With the reality of continuing defense funding cuts, multiple coalitions of advocates from Joint Capabilities Integration and Development System (JCIDS); Planning, Programming, Budgeting, and Execution (PPBE) Process; Defense Acquisition Management System (DAMS); and, defense industry coordinate collaborative efforts to influence the President's budget policy and Congressional fiscal policy in defense of funding requirements for important DoD programs (DAU, 2012b). Driving these increasingly collaborative efforts is the shared policy goal of protecting the defense budget from deep cuts that would put at risk the federal government's ability to provide for the common defense, which is required by the Constitution (The U.S. National Archives and Records Administration, n.d.).

Using qualitative, case study methodology, Stich and Miller (2008) applied the advocacy coalition framework (ACF) to better understand the current shift toward greater collaborative efforts between transportation stakeholders to influence policy. The ACF uses "the structure of beliefs in the governing coalitions of policy subsystems to predict changes in shared beliefs that lead to changes in policy over time" (Stich & Miller, 2008, p. 62). Stich and Miller explained that these beliefs are deep core, normative beliefs and values; basic political values; and policy-level positions. Wamsley argued that one coalition is often dominant over policy subsystems (Stich & Miller, 2008), which has been the case for defense acquisition coalitions. The PPBE process advocates, or resource sponsors, have comprised the dominant defense funding advocacy coalition, but with increasing pressure from Congress to justify defense spending and deeper budget cuts anticipated the influence from other coalitions is increasing (DAU, 2012b). The JCIDS coalition represents users and is critical in identifying defense capability gaps and justifying warfighter needs. The DAMS coalition, working closely with industry partners, represents the acquisition workforce that manages defense acquisitions and provides justification for technical and funding requirements to meet warfighter needs (DAU, 2012b).

The defense industries' lobbying campaign in support of the defense coalitions has stressed the importance of the defense industry to the nation's economy and seeks to influence policymakers by educating them on the devastating effects that fiscal policies, such as sequestration that indiscriminately cuts funding across most programs, will have on military programs (Herb, 2012). The multicoalitions partnership has the combined knowledge to enhance policy-learning within the coalitions and Congress. Acknowledging the interrelationships among issues faced by competing interest groups, defense acquisition stakeholders are strengthening collaborative policy networks to effectively and holistically influence public defense spending policies.

The DAU (2012a) provides that collaborative acquisition efforts between JCIDS, PPBE, and DAMS advocates need to be institutionalized in a single decision-making support system concept. “Together, the systems provide an integrated approach to strategic planning, capabilities needs assessment, systems acquisition, and program and budget development” (DAU, 2012a, para. 1). To create and implement effective policies that resolve acquisition funding and process issues, the JCIDS, PPBE, DAMS, and defense industry acquisition policy network has stressed the importance of bargaining, coalition formation, and conflict resolution as actors try to influence the decision-making process according to their own goals (Klijn, 1996).

Policy and Change

Public policy can be an effective and legitimate instrument for implementing needed social change. Dissemination of public policy that articulates the policymakers’ vision and goals can facilitate implementation of social change by first creating social behavioral changes (Burke, 2011). Burke (2011) argued that public policy implementation strategies should focus on creating new policy-compliant behavioral processes that will lead to cultural changes in support of the needed social change. This strategy for effective change is supported by Schein’s (2010) argument that behavior comes before belief, which means that the realization of the importance of the change desired will be achieved only after the new behaviors and processes have been successfully implemented.

Effective, legitimate public policies must address social change for the common good. Wedel (2005) warned that public policy is fundamentally political even though it may appear to neutrally promote needed social change. Policymakers who seek to implement their own visions may bias problems to be addressed and legitimize favored policy solutions while marginalizing others. Policymakers must also understand that complex, ambiguous, and messy policy processes are not well represented by simplified models and often fail to produce desired results (Wedel, 2005).

Policymaking must ensure that short-term policy decisions support desirable long-term outcomes. In addressing a long-term social change effort, Lempert, Popper, Min, and Dewar (2009) argued that to design effective short-term policies requires detailed analysis of how various strategies will drive a long-term transition and determination of which actions will be most likely to endure over the decades needed to reach long-term goals. If policymakers ensure that important factors, such as the common good and desirable long-term results, are taken into account then public policy can be an effective and legitimate instrument for implementing needed social change.

Resistance to Change

Berger and Luckmann’s (1966) discussion of social construction of reality further explains how culture develops. They argued that social construction of reality is the concept that when decisions about “how things are” or “how things should be done” are originally made, the individuals involved understand the reasons behind the decisions and that those decisions could be made differently. However, when these “how come” and “how to” type decisions or understandings are presented to others (children or new employees, for example), there is not the same understanding of the reasons behind the decisions. Therefore, these understandings passed down just are the way things are and become reality for that family, social group, or organization. Berger and Luckmann (1966) argued that human constructed reality provides stability to human conduct and, therefore, human interactions. Conduct inconsistent with the socially constructed reality of the group or society would create instability in human interactions and could be considered unacceptable to the group, as a whole (Berger & Luckmann, 1966).

An organization’s culture stabilizes the organization and must be understood and taken into account in order to implement successfully change (Burke, 2011; Linn, 2008; Schein, 2010). Alignment of the desired change with these core cultural beliefs, shared by organization members, increases the likelihood of successful organizational change (Linn, 2008). Organizational maturity has a significant impact on the level of difficulty faced by the leader in changing the culture (Burke, 2011; Schein, 2010). The leader of a new organization has significant influence over the development of culture. If the leader’s vision and goal achievement strategies are credible, lead to early successes, and the leader models the espoused ideals, the leader’s ideas and values will often be institutionalized in the organization’s culture (Burke, 2011).

In mature organizations, like the DoD, changing organizational cultural is difficult and should be avoided unless absolutely necessary to successfully implement change initiatives (Linn, 2008). Deeply ingrained values and beliefs of a mature organization’s culture creates stability and often leads to strong resistance to changing the status quo (Berger & Luckmann, 1966). Resistance to change at the individual, group, or organization level can be a significant obstacle to a change effort (Burke, 2011). If it changes at all, culture is the last to change during a change implementation effort (Linn, 2008; Schein, 2010). Schein (1990) argued “many organizational change programs that failed probably did so because they ignored cultural forces in the organizations in which they were to be installed” (p. 118).

Defense acquisition policy change rationale should create process alignment between acquisition programs, greater cost control, new technology limitations that decrease risk, and increased innovation through use of diverse, cross-functional teams (GAO, 2012a). These change implementation goals are not well aligned with defense acquisition culture and are creating resistance in the acquisition workforce (GAO, 2012b; Linn, 2008). Although, adaptive changes need to be made, some acquisition workforce members choose to maintain the status quo, focus on different personal goals, and resist the change (Oreg & Berson, 2009).

Pascale, Millemann, and Gioja (2000) argued that in organizations, such as the DoD, whose leadership is oriented to order and control, resistance to change implementation is more likely to be found among leadership than the workforce. Although rules facilitate order and stability, too many rules can freeze an organization into inactivity while too few rules may lead to chaos and dispersion (Pascale, Millemann, & Gioja, 2000). These authors also argued that stability can decrease an organization’s responsiveness and ability to adapt to a changing environment. Structure and simple rules tend to best facilitate the required shift to a new state that enhances an organization's ability to survive in an ever-changing environment (Pascale et al., 2000).

Kotzian's (2009) study employed quantitative survey methodology with 1284 acquisition workforce respondents to examine the relationship between leadership and culture and retention. He found that short-term, tangible incentives, like pay, benefits, and workspace, were ineffective in retaining acquisition workforce members, while organizational change initiatives that align culture and leadership styles with those desired by acquisition workforce members were more likely to be successful in meeting retention goals. Kotzian (2009) argued "without such an alignment, the acquisition community will continue a never-ending cycle of wasting resources by advocating short-term solutions that will never fully resolve the serious issue of finding a meaningful way to improve the Defense Acquisition Workforce retention rate" (pp. 48-49). This study can be generalized to the acquisition workforce as a whole. The study stressed the importance of retaining acquisition expertise through cultural alignment and transformative leadership to affect needed change. Kotzian's (2010) study also utilized the 2009 data set and found that leadership training needs to be enhanced across all levels of DAU training, especially training events provided early in the acquisition workforce members' careers.

Frick (2010) argued that the DoD's risk-averse culture permeates the defense acquisition community and reinforces the status quo. The DoD's acquisition workforce culture is risk adverse, accomplishes the mission at any cost, protects its turf, and is resistant to changing the acquisition 'way of doing business.' This author stressed the importance of cultural change in the DoD to embrace agile acquisition, which requires a culture that encourages risk taking and innovative thinking.

Unfortunately, the oversight reporting requirements to enforce the acquisition rules are so extensive that many program managers ask when they are supposed to have time to actually manage their programs (Eide & Allen, 2012). Buried in rules and bureaucratic red tape, acquisition program managers have little time or flexibility to identify and find innovative solutions to the adaptive challenges faced by defense acquisition programs due to issues like decreasing budgets, changing threats, and evolving technology. Eide and Allen (2012) further supported the need for effective cultural change implementation in the DoD in their argument that DoD culture has effectively resisted leadership attempts to embed desired behavior.

Oreg and Berson (2009) employed quantitative, survey methodology to test the relationship between leaders' transformational behavior and followers' resistance to change in the Israeli public school system. Participants from 75 Israeli public schools included 75 principals and 586 teachers. Oreg and Berson (2009) explained that team members often chose to maintain the status quo, focus on different personal goals, and resist the change. Employing a transformational leadership style, leaders can reduce resistance and facilitate change by creating a sense of urgency and communicating a compelling vision that mobilized followers in support of adaptive change. Leaders should focus the team on a clearly defined, phased approach with achievable goals that make successes possible early in the effort to gain momentum and motivation (Oreg & Berson, 2009). Oreg and Berson's (2009) study findings indicated that transformational leadership behavior is negatively correlated to follower resistance to change. The findings provided further evidence for the need for transformational leadership in implementing organizational change.

Jones and Corner (2012) argued that complex adaptive systems (CAS) theory provides an effective foundational understanding of organizational adaptation in rapidly changing environments. Grounded in complexity science and systems theory, CAS is a holistic perspective that addresses emergence of complex organizational change in response to dynamic environments (Jones & Corner, 2012). This theory aligns well with Schein’s (2010) theoretical framework and supports the need for a holistic, transformational approach to implementing policy change in the highly turbulent DoD environment. This perspective suggested that the DoD should function as a complex adaptive system that adapts to complex changes in its environment to overcome the shortcomings of the traditional ‘closed-system’ machine model perspective, which does not address the need to respond to increasing complexity in the DoD and its dynamic external environment (Pascale, Millemann, & Gioja, 2000). A theme that emerged from my review of organizational theories and processes is the effectiveness of collaborative organizational structures for addressing complex problems in dynamic environments.

Transformational Strategies Enhance Likelihood of Change Success

Recent trends in leadership and organizational change are being driven by dynamic trends in the complex, high technology, globalized environment (Karp & Helgø, 2008). To face these challenges now and in the future, leadership must change in order to create successful organizational change. More than simple changes in individual leader skills and characteristics must change, the whole concept of leadership must change. Karp and Helgø (2008) argued that the all-important, all-knowing, and all-controlling leaders of the past, who were effective in stable and uncomplicated environments, are not effective today and will be even less effective in tomorrow's increasingly fast-paced, uncertain world. Providing innovative solutions to complex problems requires teams of diverse, highly-skilled people who are motivated and mobilized to act. Leadership now and in the future is about building relationships and influencing people. These authors explain that motivating people to have a desire to act is not enough. Mobilizing diverse, innovative teams to action in creating organizational change to gain competitive advantage in response to the dynamic, high technology external environment is required for survival and success (Karp & Helgø, 2008).

My review of the literature has established that the U.S. economic crisis and scandalously poor defense acquisition outcomes are driving the need for transformative change in the DoD (Cancian, 2010; Hofbauer, Sanders, Ellman, & Morrow, 2011). Schein's (2010) framework provided an understanding that crises and scandals can force an examination of practices, norms, and tacit assumptions; can be powerful disconfirming events that are undeniable; and can start the self-assessment and change processes. The current crises are creating the necessary conditions for the DoD to implement new practices and values that, in turn, must improve outcomes to become new cultural elements.

Schein's (2010) framework provided two options for changing dysfunctional cultures: destruction of the organization or a transformational change, or turnaround, of the dysfunctional parts of the culture to enhance organizational adaptability. Destruction of the DoD and its national security mission is not a viable option, so transformative change will be required. Schein (2010) explains that transformational leadership is needed to drive behavior changes to start the process of developing new cultural assumptions.

Porras and Silvers (1991) provided a discussion on organization change theory that supports Schein's (2010) proposition that behavioral change is needed before changes in underlying belief systems change. Porras and Silvers's (1991) planned process model began organizational change efforts with Organization Transformation (OT) and Organization Development (OD) intervention strategies, which respectively affect the organizational target variables of vision and work setting. The changes in vision and work setting affect cognitive and behavior changes in the individual organizational members, which lead to the organizational outcomes of improved organizational performance and enhanced individual development (Porras & Silvers, 1991). Behavioral change is broken down into alpha change (perceived changes in variable levels within the cultural belief system), beta change (change in views regarding variable value within the cultural belief system), and gamma change (change in the cultural belief system).

Aligning well with Schein's change model, the planned process model breaks down the phases of change in a behavioral context. Gamma change, or culture change, is the most difficult to attain and requires both OT and OD intervention strategies to enhance likelihood of a successful change outcome (Porras & Silvers, 1991). OT interventions should align as closely as possible with the existing organizational culture and focus on the change vision to provide the way ahead.

OD techniques employ team-building activities to intercede where change was required. OD addresses the human aspect of change required, emphasizing involvement of the workforce in decisions and the change effort (Burke, 2011). OD interventions typically focus on cultural subsystems to allow values and norms under which people operate to be questioned (Smircich, 1983). Smircich (1983) argued that OD “activities then serve to make the culture more receptive to change, facilitating the realignment of the total organizational system into a more viable and satisfying configuration” (p. 345).

The significant changes in the DoD acquisition policy provided the OT intervention required to change the organizational target variable, vision (Under Secretary of Defense for Acquisition, Technology, and Logistics, 2008). The DoD OD intervention strategy designed to change the organizational target variable, work setting, requires that all defense acquisition personnel attend policy training courses that describe new processes and cross-functional teaming arrangements appropriate to their acquisition career fields (Fishpaw, 2010; Kotzian, 2010). In regards to organizational change theory, Burke (2011) argued that vision, or cognition, is a necessary first step, but it is not enough to affect change. The focus of the organizational change implementation strategy must be on the behavioral change needed. This author provided that “even though organizational executives make pronouncements such as ‘we’ve got to change people’s mental sets around here!’ the change in mental set comes after behavior has occurred in the direction desired for the new mental set” (Burke, 2011, p. 151). Porras and Robertson

(1992) also argued that for organizational change to occur, personnel must modify their on-the-job behavior to comply with the required change.

Bass's theory of transformational leadership states that more adaptable and flexible team leadership is required to develop creative solutions to complex problems in order to adequately respond to the challenges created by the rapid pace of change (Bass, Avolio, Jung, & Berson, 2003). The most recent acquisition legislation and policies align well with Schein's framework, as well as, Bass's theory and the organizational change theory. The policies are designed to enhance effective and efficient use of taxpayer dollars and government resources by requiring increased technologic maturity, increasingly stable requirements and funding, cross-functional (cross-cultural) teaming, systems engineering (systematic thinking), and incremental delivery of useful and supportable end items in support of national security priorities (Under Secretary of Defense for Acquisition, Technology, and Logistics, 2008; see also Schein, 2010). Burke (2011) argued that the transformational leadership strategies needed to overcome resistance to organizational change include employing a transformational leadership style that clearly communicates a focused, phased approach, which facilitates early successes; mobilizes a team of change agents; aggressively counters resistance at all levels; and, models enthusiasm and a heartfelt commitment to change.

Transactional to transformational leadership continuum. Transactional leadership can be successfully employed during times of organizational stability, while transformational leadership is most often required to address complex change (Burke, 2011). The transformational leader's approach to the DoD policy change should include a clearly articulated vision to motivate, inspire, intellectually stimulate, and demonstrate positive outcomes keeping the focus on the end-state (Bontis & Serenko, 2009). The transactional leader's approach includes development of task requirements, teaming arrangements, reward systems, and standards of conduct, focusing on the means to achieving the end-state (Hackman, 2010).

A single leader could, theoretically, employ different styles along the transactional to transformational leadership continuum. However, each leader possesses different education, expertise, and skill sets, so leadership teaming is encouraged under DoD acquisition policy (USD [AT&L], 2008). This teaming concept provides for the broad range of leadership skills required. These critical skills range from: reactive to proactive; logistical administrator to strategic visionary; concrete detailed to intuitive "big picture" thinking and communication; short-term to long-term goal setting; and, stabilizing to transforming/changing organizations (van Eeden, Cilliers, & van Deventer, 2008). The transformational leader acts as a change agent, driving the change required by the new DoD policy. The transactional leader ensures that tasks required for this change are accomplished.

Transformational techniques are particularly important to adapt high technology programs that are greatly impacted by the rapidly changing technology environment (Hughes, Ginnett, & Curphy, 2010). DoD acquisition programs must increasingly employ transformational leadership to adapt to dynamic environmental changes to be successful in providing public value (GAO, 2012a). The transformational style is considered most effective for change, but both styles are required for organizational success (Bass & Riggio, 2010; Burke, 2011; Burns, 2010).

Leadership and management skills required. When differentiating the concepts of management and leadership along the leadership continuum, organization management tends to be transactional in nature, while leadership is thought to be transformational (Burke, 2011). Kotter (1996) argued that management is a set of processes that "include planning, budgeting, organizing, staffing, controlling, and problem solving," while leadership "creates organizations, ... defines what the future should look like, aligns people with that vision, and inspires them to make it happen despite the obstacles" (p. 25). Leadership and management are similar in their focus on organizational goal achievement, but represent different roles in achieving the goal. Leadership communicates strategic vision and develops relationships with and takes into account the desires of followership to get buy-in on what needs to be done. Management administers the resources and takes action to achieve the vision to meet the needs of the organization (Plachy, 2009).

DoD acquisition management is broken down by functional areas (Fishpaw, 2010; Maccoby, 2000). The functional area managers integrate across all functions to ensure life cycle considerations are addressed early in the process. For example, the contracting officer manages program contracts and must incorporate inputs from program management, systems engineering, test and evaluation, finance, and logistics functional areas to ensure contracting efforts support program goals. The complex DoD acquisition process requires partnering between cross-functional experts who manage resources and the program office leadership who maintains vision focus and stakeholder relationships. A successful DoD change effort needs transformational leaders with strong coordinating skills to articulate the vision and transactional managers with strong administrative skills to take action to accomplish the vision (Plachy, 2009).

Leadership styles in the DoD. Different capabilities are required of leaders and managers. The leadership role often requires intuitive, big-picture, strategic thinkers with strong diplomatic skills. The management role often requires concrete, detail-oriented, logistical thinkers with strong tactical (troubleshooting) skills (Keirsey, 1998). Keirsey (1998) explained that leaders and managers should apply their own preferences and strengths in selecting their roles to achieve the desired results. The roles and responsibilities that define goals (leader) and accomplish goals (manager) must fit together along a timeline for an organization to achieve mission success (Keirsey, 1998).

Team leadership is a form of transformational leadership and is proactive in nature: Establishing team cohesiveness through a common purpose, goals, and work effort; providing cross-functional expertise; allowing the team to make decisions; and is most effective when addressing complex efforts, such as complex systems development (Herman, 2000). Bion (2008) supports the importance of team leadership, arguing that "leadership plays a predominantly facilitative role, intervening at select moments only. The art of leadership ... is to recognize those crucial moments in which leaders must make critical decisions" (p. 290). Leadership as a tool must be employed appropriately depending on the circumstances and the individual personalities and skill sets involved to successfully implement public policy in response to the environment at hand (Bion, 2008; Herman, 2000).

The recent acquisition policy change efforts have been initiated to increase responsiveness to changes in the complex, high technology external environment (Kotzian, 2010; Kratz & Buckingham, 2010; O'Neil, 2011). These changes include a shift from directive to participative or cross-functional team leadership styles (Bass & Riggio, 2010). The team building efforts help to institutionalize a culture that supports an appreciation of differences, which brings multiple perspectives and innovations to high performing teams. Cross-functional teams also capitalize on multigenerational diversity through the understanding and utilization of unique strengths possessed by the different generations in the workforce (Bass & Riggio, 2010). The DoD's ongoing organizational change efforts are aligned well with Schein's framework for change, encourage diverse perspectives, and facilitate positive behavior change to achieve culture change to better meet individual needs and changing mission requirements in a dynamic environment.

Due to the complexity of the acquisition process, DoD policy encourages employment of cross-functional teams, sometimes called Integrated Product Teams (IPTs), to incorporate complementary education, expertise, and skill sets needed to develop products to increase workforce competencies and encourages cross-functional teaming in DoD guidance for implementing acquisition policy (Eide & Allen, 2012). Workforce members come to the acquisition team with differing levels of expertise, functional knowledge, and skill sets. Leaders must have the ability to apply a range of leadership techniques along the transactional to transformational leadership continuum to appropriately interact with all acquisition workforce members (Hughes et al., 2010).

Aldoory and Toth's (2004) study employed a mixed-methods methodology that incorporated a quantitative survey instrument and qualitative focus groups. The study findings showed a significant preference for transformational over transactional leadership styles for addressing complex change in the turbulent, public relations environment (Aldory & Toth, 2004). Allio (2010) supported the importance of employing transformational techniques to complex policy implementation in a dynamic environment. Allio found that the use of transformational leadership techniques enhanced organizational responsiveness in addressing slow growth, information overload, and increasing diversity in a complex, dynamic environment. Relationship building within and between organizations is critical for adaptive change implementation in response to a rapidly changing environment (Allio, 2010). These studies further support the transformational change emphasis of DoD acquisition policy and DAU training, which requires implementation of multicultural, or cross-functional, teaming; relationship building: and development of extensive networks within the DoD and with outside stakeholders and policy makers.

In their quantitative study, Boyne and Walker (2010) found that there was a relationship between tailored strategic planning and collaborative efforts, goals identification, and organizational change implementation success. The authors argued that strategic, transformational leadership aligns organizational capabilities with the environment, which facilitates complex organizational change and enhances performance. This study also supported use of transformational techniques in strategic planning to identify future challenges, establish a vision and goals, and implement adaptive change to overcome the challenges of a changing environment.

In a quantitative study, Maccoby (2000) analyzed survey results to better understand the differences between management's transactional, administrative functions and leadership's transformational, leader/follower relationships. Although there is not one right answer in employing leadership techniques, Maccoby (2000) argued that transformation leadership was important in implementing complex change. This research further supports my study by addressing transformational, relationship-building, which is emphasized in the DAU's scenario-based training in support of policy change implementation.

In their review of current research, Messeri and Richards (2009) argued that technological interoperability is key to overcoming the problem of developing standards required by the highly technical space industry in support of future robot repairs of space-based assets. Transformational techniques, including vision and industry networking, will be needed to establish required interoperability standards in space acquisition communities (Messeri & Richards, 2009). This study supports my research by addressing a complex problem faced by acquisition personnel that will require transformational networking skills to implement acquisition policy changes incorporating interoperability (open) standards.

Using quantitative survey methodology, Feiock, Steinacker, and Park (2009) studied the relationship between transactional issues and costs and a local government's choice to collaborate with other local governments to enhance economic development. Their research sought to discover why some local governments engage in cooperative agreements while others do not. Feiock et al. hypothesized that the willingness of local governments to cooperate with one another on economic development increased with decreased distribution, agency, and information transactional costs and was influenced by the city's demographics, politics, and networks. The authors' findings identified relationships between the dependent variable (inter-governmental cooperation) and four independent variables: joint gains, division of gains, agency costs, and information costs. Joint gains, in which benefits outweigh the costs, increased inter-governmental cooperation. Division of gains, in which greater conflict is experienced when one partner has more bargaining power, decreased willingness of others to collaborate. Agency costs, in which costs increase due to the agent not representing all interests of the city's citizenship, decreased cooperation. Information costs, in which the costs of obtaining information about potential city partners decreased when cities were in close proximity of partners and strong network connections exist, increased inter-governmental cooperation on economic development efforts (Feiock, Steinacker, & Park, 2009). Although this study cannot be generalized beyond the represented study population, the results provide a better understanding of collaboration enhancers and barriers.

Employing quantitative analysis of secondary data and building on Fiol's (1999) study, Seyranian and Bligh (2008) addressed social change implementation effectiveness between charismatic and noncharismatic U.S. presidents. A transformational leadership quality, charisma tends to enhance loyalty of followers and change implementation aligned with a compelling vision. They found that a phased approach that does not directly contradict accepted norms was most successful in creating social change. This approach included breaking down conventional wisdom; moving away from conventional wisdom; and aligning beliefs with the vision for social change (Seyranian, 2008). Seyranian and Bligh’s (2008) phased approach framework supports Schein’s (2010) change model, which was used to examine the DAU training approach that facilitates the DoD policy change implementation strategy.

Carl and Freeman (2010) used quantitative survey data to identify nonstationary root causes of defense acquisition program failure, which included volatile requirements, unstable funding, immature technical processes, and undisciplined workforce processes. They argued that to adapt to an external environment that is rapidly changing, acquisition programs need to adopt incremental development methods that define iterated shortened incremental cycles (Carl & Freeman, 2010). These shortened acquisition cycles must emphasize decreased risk and increased technical maturity. Incremental development is made up of individual, overlapping program increments that each provides increasingly enhanced, useful, supportable capability and are individually short enough that the environment remains approximately stationary (Carl & Freeman, 2010). Carl and Freeman explained that the explicit need to adapt to environment change should not mean constant and costly program changes, but a commitment to delivering capable technology as it matures in shortened increments that will, in the long run, meet stakeholder requirements. Defense acquisition policy changes have incorporated incremental acquisition as a best practice in policy documents and DAU training curriculum (USD

[AT&L], 2008). The GAO (2009a) supports the concept of acquiring only achievable capabilities with mature technology to meet well-defined requirements in short incremental development and procurement cycles to enhance cost estimate accuracy for predicting budgetary requirements and to allow for appropriate allocation of funding.

Cross-functional teaming. Van Alstyne (1997) argued that network organizational structures provide greater flexibility and responsiveness to address rapidly changing environments and rising competition. Van Alstyne explained that cooperative problem solvers could better address rising complexity by employing the understanding that value is created when the knowledge and skill complements of experts are combined. Empowering cross-functional teams from inside and outside of organizations to bring differing perspectives to bear on complex policy problems has proven to be more effective in developing comprehensive solutions than traditional top-down decision-making (Burke, 2011; Clawson, 2012; Pearce & Conger, 2010; Schein, 2010; Van Alstyne, 1997). The transformational approach of employing cross-functional teams to bring people with different skills, backgrounds, and perspectives together to exploit diverse ideas for development of implementation strategies to respond to complex environmental changes is not only sustainable in the contemporary workplace it is required if organizations are going to adapt in the increasingly dynamic information age (Burke, 2011).

The Rendon, Apte, and Apte (2012) study employed a quantitative, survey methodology that supported the importance of cross-functional teaming in the acquisition workforce. The authors explained that although the acquisition workload has increased, the size of the workforce has decreased in response to budgetary pressures. Defense acquisition program and contract management best practices employ cross-functional project teams with requisite technical skills, which enhance integration and control of required functional disciplines involved in the acquisition effort (Rendon, Apte, & Apte, 2012). A phased managerial approach provides additional program control at gates and decision points. Study findings showed that a lack of control and functional integration in acquisition programs increases the risk of not achieving cost, schedule, and performance goals (Rendon et al., 2012).

Another best practice identified by the study is the adequate training and formal designation of a program manager to oversee overall program objectives and integrate the program's differing functional interests, such as contracting, engineering, procurement, finance, and logistics (Rendon et al., 2012). The acquisition team must have an adequate number of appropriately trained personnel to provide the oversight required in managing complex procurement programs. Rendon et al. (2012) argued that effectiveness and availability of training must be increased to ensure that the acquisition workforce is qualified to address the complexities of defense acquisition.

HR Magazine (2010) provided that diverse perspectives and skill sets of individuals assigned to cross-functional teams facilitate positive change in organizations to better meet changing mission requirements in a dynamic environment. Diverse team members in inclusive work environments bring differing perspectives and leadership styles, which provide a broader outlook and greater flexibility in overcoming challenges (*HR Magazine*, 2010). Bias in team member selection due to gender, race, age, disability, or sexual orientation decreases the talent pool from which leaders and self-directed teams can build high-performing, cross-functional teams. Making use of generational diversity by recognizing and employing the strengths of a multigenerational workforce provides additional opportunities for positive organizational change (Bass & Riggio, 2010; *HR Magazine*, 2010). Leveraging diversity increases individual and organizational performance (Stevens, Plaut, & Sanchez-Burks, 2010).

Furthermore, the DoD should empower acquisition professionals by mandating power sharing between teams and leaders in an environment of trust, honesty, and diversity appreciation (Offermann, 2010). Offermann argued that successful cross-functional teams learn to value the diversity of skill sets and prospective necessary to create complex solutions in a dynamic, high technology environment. Employing transformational approaches, DoD leaders must build and manage relationships, provide a networking bridge to other acquisition stakeholders, and provide training and policy guidance resources required by the functional teams. The empowerment strategy should involve team member understanding of why each job is important to program success and each has the power, responsibility, and resources needed to make decisions to enhance success (Ciulla, 2010).

Ethics in Organizational Culture

Schein’s framework does not specifically address ethics; however, a discussion on the foundation of bureaucratic ethics, ethics theory, and ethical guidelines is provided, because these guidelines are critical for behavior change in the large, geographically-dispersed DoD organization.

Foundation of bureaucratic ethics. Democratic governance is the foundation of bureaucratic ethics. In America, bureaucrats are nonelected officials who swear an oath to uphold the constitution and participate in the governing of the democracy (Rohr, 1982). Rohr (1989) argued that democratic principles require that governing officials, whether elected or unelected, must be held accountable to the people; however, popular control does not apply to officials who are not elected. Therefore, bureaucrats have an ethical obligation to exercise their discretionary authority in accordance with the constitutional values of the citizens that they govern (Rohr, 1989). Constitutional ideas lead to administrative practices for implementation of principles and values (Rohr, 2007). The principles of democratic governance are reflected in America's constitutional values, such as freedom, equality, and property, and are the foundation of bureaucratic ethics in this country.

Democratic governance requires America's decision-makers to make compromises between competing principles and values. Compromise is an important value in effective organizations that allows one ethical principle to yield to another, as appropriate. Bureaucratic ethics require that constitutional values have influence on governing decisions and that bureaucrats follow their conscience in making decisions that are appropriately responsive to these values. Rohr (1989) reminded his readers that

It would not be wise or desirable to distort the principle of responsibility in government into meaning that we simply present our bureaucrats with a checklist of acceptable American values they must swear to uphold. The best we can do, at least in the schools of public administration, is to encourage bureaucrats to reflect on our values, suggest a method for doing so, and then trust them to exercise their discretion along lines compatible with those values (Rohr, 1989). Constitutional values encourage bureaucrats to be responsible to the people in the employment of discretionary authority when governing in the American democracy.

Ethics theory. Organizational culture encompasses the beliefs, norms for conduct, traditions, and symbols of an organization (Burke, 2011; Cooper, 2006; Schein, 2010). Franklin and Raadschelders (2004) argued that morale dilemmas tend to deal with the clear distinction between right and wrong, while ethical dilemmas deal with the degree of rightness, or the distinction between right and more right. Cooper (2006) provided that ethics is the examination of values, beliefs, principles, and rational used to justify morality, which is the difference between right and wrong behavior. Organizational cultures have significant influence over the behavior of personnel separate from and possibly in opposition to the policies, regulations, procedures, and authority figures (Cooper, 2006).

Changing defense acquisition policy and law is a good first step, but change efforts will likely continue to be met with resistance because culture is slow to change. Cooper (2006) argued that organizational leaders and members must “not only be motivated to engage in systematic ethical reflections but … to consider alternative courses of action, imagine the consequences of each, and anticipate self-approval or disapproval” in support of designing a resolution that facilitates ethical conduct in individual attributes, organizational culture and structure, and societal expectations (p. 218).

Cultural change will require a combination of alternative resolutions to facilitate change, which includes training new behaviors and leaders modeling new behaviors that are compliant with changes in policy (Cooper, 2006; Mittelman, 2002). Ethical or unethical conduct of acquisition workforce members is strongly influenced by DoD culture. Changes in acquisition policy must drive changes in behavior through efforts like leadership modeling and acquisition workforce member training, which should lead to behavior change that will, in turn, lead to cultural changes required for compliance with acquisition policy (Cooper, 2006; Edison & Murphy, 2012; Schein, 2010).

Ethics theories include deontological ethics, requiring the strict following of rules with little concern for consequences, and teleological or consequentialist ethics, determining rightness solely based on consequences (Fieser, 2009). Ethical consideration by DoD leadership should seek a middle ground between deontological and teleological ethics by complying with policy and ensuring an appropriate outcome by balancing subjective beliefs and values against objective rules and regulations (Cooper, 2006). To make the changes required to implement policy change, DoD leaders and acquisition workforce members need to undertake the process of ethical reflection, which works through, and is made difficult by, the value judgments involved; conflicting moral guides; application of conflicting moral rules and regulations; and complexities involved with analysis of moral principles (Cooper, 2006).

Guidelines for ethical conduct. Changing the acquisition policies in response to environmental changes and scandalously poor acquisition outcomes was a step in the right direction, but aggressive cultural change implementation and behavior modeling by leadership are critical to overcome resistance to change (Cooper, 2006). The guidelines for ethical conduct promulgated in the Deputy Secretary of Defense’s (2010) memorandum provide a standard of behavior required to change DoD culture by ensuring actions are based on fundamental values, regulation compliance, ethical behavior, and intolerance to violations. Fundamental values that include integrity, respect, and a lack of bias should guide all actions taken by DoD personnel. DoD leadership must lead by example and DoD personnel must hold each other accountable for violations of ethical standards (Deputy Secretary of Defense, 2010). DoD personnel are directed to act in strict compliance with ethics regulations and laws, including the regulatory Standards of Ethical Conduct for Employees of the Executive Branch (5 C.F.R. part 2635), the DoD supplemental rules in the Joint Ethics Regulation (DoD 5500.7-R), and the federal conflict of interest statutes. These govern the standards of conduct for all DoD activities, including any conflict of interest between personal and financial interests and the conduct of official business (Deputy Secretary of Defense, 2010). Personal beliefs and good intentions do not justify conduct that does not meet ethical standards, comply with policies, or creates doubt in the appropriateness of personnel actions in execution of programs and operations. Due to the complexity of governing policies, leadership must perpetually study, train, and teach these policies, model an ethical standard of behavior, and encourage the change required to ensure an ethical culture in the workplace.

The DoD’s ethical guidelines are essential for changing behavior, encouraging changes in beliefs, and institutionalizing the resulting cultural change (Deputy Secretary of Defense, 2010). The fundamental values and regulation compliance guidelines are clearly defined and, therefore, readily employed in the DoD leadership role. However, defining exactly what constitutes ethical actions and which actions should not be tolerated tends to be more challenging. Regardless of the difficulties involved, the DoD must persist in changing its culture from a culture that tolerated and supported change resistant, stove-piped behavior to a culture that respects and values diversity and promotes adaptive change (Deputy Secretary of Defense, 2010).

Training for Behavioral Change

Defense Business Board's (DBB's) Task Group Review of the DoD's Program Managers (2011) found that defense acquisition programs are taking too long and costing too much. The DBB recommended that the DoD make changes to selection, training, and management of program managers in all services to more effectively manage the greater than $400B per year spent on acquisitions. Schein's (2010) theoretical posits included behavior before belief and the need for a psychologically-safe temporary cultural island for learning. The DAU provides formal, functionally-tailored certification training to all defense acquisition workforce members. All career-field certifications require both online and resident courses. The resident courses are designed to provide a psychologically safe learning environment, scenario-based learning, and cross-functional teaming experiences (Bontis et al., 2011; DAU, 2013). Knowles's andragogy theory and constructivism provide additional support for this type of learning environment.

Knowles's andragogy theory. Knowles's (1980) andragogy theory provided that self-actualization is a key motivator in adult learning. The adult learning curriculum provided by the DAU emphasizes experiential techniques and practical application in the scenario-based training of cross-functional teams (Bontis et al., 2011). The educators' role in the DAU classroom is to facilitate the adult learning experience and to assist the learners to apply new concepts learned to their own experience, making the concepts more relevant to and supportive of problem solving in the learners' jobs or daily lives (DAU, 2012b; Knowles, 1980). Knowles's assumptions about adult learners include being self-directed; having experiences that define who they are and are a resource for learning; being motivated by socially relevant learning; and having interest in application of learned concepts for problem-solving in their daily lives (Knowles, 1980).

Constructivism. A supporting world-view is constructivism, which provides that people construct their own subjective reality (Piaget, 1929, 1955). Bruner's application of constructivism provided a theoretical understanding of how learn-by-doing training, in which students use their existing knowledge and skills, can lead to application of new concepts and behavioral change on-the-job (Burr, 2003). Bruner's application of constructivism aligns well with Schein's framework and further supports my research, which tested the relationship between the learning achieved in the DAU's scenario-based, learn-by-doing training approach and the students' ability to apply the learned policy-compliant behaviors on-the-job.

Ng'ang'a and Otii's (2013) study employed a mixed-methods methodology that addressed problem definition in the university level constructivists learning environment and activities. The authors explained that Brunner's application of constructivism emphasized the interaction between individuals and culture in learning and provided a framework in which learning takes place in interactions with older, more learned members of the organization. This construct supported the DAU's use of faculty members who are very experienced and knowledgeable in their field. The study findings also confirmed the effectiveness of the Likert scale in assessing teaching creativity at the university level. This qualitative study provided a comprehensive understanding of the topic from the perspective of a small number of participants, so the study findings cannot be generalized to a broader population.

Mandates. The DAU is the DoD corporate university formally mandated under U.S. Code - Title 10, Section 1746, to provide education and training to the defense acquisition workforce (Fishpaw, 2010). The U.S. Code - Title 10, Section 1746(a) provides that

> The Secretary of Defense, acting through the Under Secretary of Defense for Acquisition, Technology, and Logistics, shall establish and maintain a defense acquisition university structure to provide for - (1) the professional educational development and training of the acquisition workforce; and (2) research and analysis of defense acquisition policy issues from an academic perspective. (Fishpaw, 2010, p. 69)

The Title 10 mandates that the DAU provide acquisition training to a globally-distributed workforce (Mikesell, 2011). This requirement has significant implications for the DAU's fiscal and budgetary planning and operations. Title 10 provides a broad understanding of what must be done to successfully provide public value, allowing the DAU to conduct resource planning and submit funding requirements in accordance with the DoD's budget process. However, due to the very broad nature of the Title 10 requirement, multiple stakeholders develop diverse and ever-changing definitions of what constitutes successful provision of the acquisition training requirement. The DAU lacks the size necessary to respond flexibly to significant expenditure changes created by changing requirement expectations (Mikesell, 2011). DAU stakeholder expectations are an example of informal mandates that require the DAU to provide training that will improve defense acquisition program outcomes in an increasingly fiscally-constrained environment (Bontis et al., 2011). The mandates justify and guide development of the organization’s purpose and mission, which defines why the DAU does what it does.

DAU mission and values. The DAU (2012) provides that “DAU values of alignment and teamwork, customer focus, performance excellence, and speed and agility form the basis for providing our customers the very best in acquisition learning and development” (p. 4). The DAU mission statement is: “Provide a global learning environment to develop qualified acquisition, requirements, and contingency professionals who deliver and sustain effective and affordable warfighting capabilities” (DAU, 2013, p. 12). The DAU’s mission statement articulates the primary acquisition services provided to enhance the quality of acquisition professionals in support of the DoD mission around the world. The DAU’s mission statement clearly articulates that the DAU exists to develop qualified acquisition professionals to enable effective and affordable warfighting capabilities (DAU, 2013). The DAU (2013) also addressed how this need will be met by providing acquisition training, mission assistance, knowledge sharing resources, and continuous learning assets.

Employing transformational techniques, DAU (2013) training is designed to develop cross-functional teams and clearly articulate the DoD vision, keeping the focus on successful alignment of DoD acquisition efforts with DoD policy. Employing transactional techniques, they develop and teach task requirements, teaming arrangements, reward systems, and standards of conduct, which focused the acquisition workforce on the means to achieving the change outcome (DAU, 2013). The DAU's tailored curricula reflect the acquisition process policy changes and were designed to facilitate successful defense acquisition workforce behavior change to comply with the DoD policy.

The DAU's role provides defense acquisition certification training and mission assistance in support of DoD acquisition policy change implementation initiatives (Bontis et al., 2011; Eide & Allen, 2012; Kotzian, 2010). Development of guidance products, mission assistance capabilities, and training programs include new work processes to concentrate on the behavior changes needed to meet the new policy requirements (DAU, 2012). This strategy for effective change is supported by Schein's (2010) posit that behavior comes before belief, which means that the realization of the importance of the change desired will be achieved only after the new processes have been successfully implemented (see also Burke, 2011). The DAU's role in the DoD acquisition policy change is to communicate the DoD vision for change across the acquisition communities and to provide guidance products, services, and training to affect behavioral change in support of policy goals. Behavior change should drive culture change that will emphasize flexibility, affordability, technical interoperability and maturity, transparency, collaboration, and innovation (Burke, 2011, Eide & Allen, 2012; Schein, 2010).

DAU training. The DAU provides training and assistance initiatives to facilitate policy compliance by the acquisition workforce (DAU, 2012). To affect successful change, the DAU creates training curriculum and outreach resources that enhance acquisition policy understanding and buy-in of the acquisition workforce. The DAU's career-field specific curriculum is updated as quickly as possible to reflect policy changes as they occur (Redshaw, 2010). The DAU's change implementation efforts should overcome the threats identified in its strategic plan that included speed of technology advancement, impact of DoD budget constraints, political uncertainty, and perception that training does not improve program outcomes (DAU, 2013).

Bontis, Hardy, and Mattox's (2011) study employed quantitative methodology, analyzing DAU secondary data. The authors conducted an evaluation of the DAU's training and data collection methods. Data from over 300,000 training events collected over a 19-month period was analyzed using structural equation modeling to test the relationship between predictor variables and the outcomes, job impact (referred to as *applied training* in the present study) and business results (Bontis et al., 2011). Bontis et al. confirmed the validity and reliability of DAU survey instruments. In another 2011 study, Bontis, Richards, and Sarenko found that a significant relationship exists between the predictors (job characteristics, autonomy, and challenging work) and the outcome (employee satisfaction). They also found that information sharing and employee satisfaction contribute to operational efficiency and customer focus. In the Bontis, Hardy, and Mattox study, worthwhile investment, courseware quality, and instructor effectiveness were found to be significant predictors of individual learning (referred to as *learning achieved* in the present study). Individual learning was found to be a significant predictor of perceived future business results and job impact. These perceived results significantly impacted actual business result and job impact.

The findings of these studies indicate a need to further enhance the student's opportunity to apply what is learned in the training environment (Bontis et al., 2011). The need to enhance application of learning in the DAU training environment is an important finding; however, the author does not break out career fields or course-type subgroups, so it is unclear which curricula needs to be changed to enhance application of learning. This research may contain biasing inequality, because the sample may not have been divided into enough subgroups to ensure internal homogeneity (Frankfort-Nachmias & Nachmias, 2008).

Of significant relevance to my research study, the Bontis et al. (2011) study examined some of the same independent and dependent variables and some of the covariates that I used. Although these researchers used structural equation modeling, I used SPSS to analyze the DAU secondary data to establish whether a relationship exists between DAU formal training and the ability to apply learned behavior in the DoD workplace. Strengths of the Bontis et al. study included the use of the causal modeling, or structural equation modeling, statistical technique to test multiple hypotheses simultaneously and to determine likely causation relationships between variables. The authors provided a comprehensive discussion of the method used to establish the findings that the DAU survey instruments are valid and reliable. They also assessed the relationship between the students' perception of job performance and job impact attributable to the DAU training. The drivers and outcomes of learning were assessed and benchmarked against similar organizations and change recommendations were made based on the findings (Bontis et al., 2011).

One of the most interesting results from the Bontis et al. study is that the relationship between instructor effectiveness and individual learning is nearly twice as high for the DAU as compared to peer organizations. Bontis et al. argued "by comparing the magnitude of the relationship between the DAU and the benchmark, clearly, instructors hold more influence within DAU than at other organizations" (p. 359). A limitation of the quantitative study is that the research does not provide an in-depth understanding of why the results are what they are. Another limitation is that the data was not analyzed by functional skill sets for which the course curriculum is tailored. The results that learning achieved is a causal factor for predicted job impact and predicted job impact is a causal factor for realized job impact, but learning achieved is not a causal factor for realized job impact is not explained by this study. Further quantitative study of the data or a mixed-methods approach is needed to better understand the relationship between learning achieved and job impact, or *applied training*, for the different functional acquisition career fields.

Schein's framework and the literature reviewed provide that learning application and transformative, teaming leadership techniques are critical to implementing behavior change. Bontis et al. (2011) and Kotzian (2010) argued that learning application and transformative leadership training, respectively, need to be enhanced in DAU training. Scenario based training is employed in a majority of DAU classes to enhance learning application in the classroom. Cross-functional teaming is emphasized in many DAU classes to address the need for transformative leadership in a dynamic environment. The problem for enhancing these techniques is identifying which of the DAU's 105 courses supporting the 10 major acquisition career fields needs to be changed (DAU, 2012). In FY2012, the DAU conducted 7,133,183 hours of training and had 216,399 total graduates of which 157,956 were online graduates and 58,443 were classroom graduates (DAU, 2012).

Online and classroom courses. In a globalizing environment, many organizations are employing technological solutions to mitigate the challenges associated with managing teams that are geographically separated (Novitiski, 2008). The DAU has addressed the reality of decreasing budgets and increasing transportation costs by bringing teams together virtually through online and telepresence meetings and training events (Bontis et al., 2011). The use of technology requires greater strategic and operational planning and coordination, but it offers cost effective ways to bring teams together in a virtual environment (Novitski, 2008).

DAU faculty teach acquisition courses in locations around the world that support large acquisition workforce populations to decrease costs associated with transporting large numbers of students (Bontis et al., 2011). Like many organizations, the DAU faces challenges of trust and control of personnel working remotely (Novitski, 2008). Novitski (2008) argued "each case is different, but the balance can be adjusted with the use of technology and an understanding of the cultural barriers created by geographic separation" (p. 83). To maintain high standards of training and support, clear communications capabilities are required for personnel working remotely to stay connected to the organization. Technology is a key enabler in providing knowledge sharing and collaboration tools, as well as, effective communication media (Novitski, 2008).

Collaborating in a virtual environment may create additional challenges that include misunderstandings due to cultural differences and the lack of body language or verbal cues. Moser explained that teams collaborating virtually must be more explicit in defining expected outcomes (Novitski, 2008,). The DAU's strategic planning process should integrate the need for collaboration, cooperation, and coordination to develop and implement innovative solutions to enhance quality, efficiency, and effectiveness of delivery of DoD acquisition support services (Bryson, 2011).

Nissen's (2012) study used a mixed-methods methodology that confirmed the dependence of defense acquisition efficacy on the quality of the acquisition workforce and examined the relationship between explicit and tacit knowledge flows and process performance in the acquisition workforce. Acquisition organizations and processes are dynamic and knowledge intensive, which makes assessing quality of the acquisition workforce and impact of policy change implementation very difficult. Static knowledge, like education, training, and experience, becomes quickly outdated in the rapidly changing acquisition environment and are, therefore, inadequate for assessing acquisition workforce quality (Nissen, 2012).

Nissen applied knowledge flow theory that enabled him to measure and analyze dynamic knowledge and performance of acquisition processes in program management and contracting organizations, as well as, military combat organizations. End customer performance was used as an operational proxy for acquisition workforce quality because it focuses on how acquired systems affect operational performance of the end user, which is a good dynamic indicator of workforce quality (Nissen, 2012). Study findings indicate that articulating knowledge in explicit form like policy documents shared via the Internet can be disseminated quickly to a broad audience, but tends to dilute the knowledge in terms of performance enabled by the knowledge. Tacit knowledge flow using techniques like face-to-face training, group interactions, and mentoring occurs more slowly in the DoD, but the knowledge passed enables knowledge-based action at a significantly higher performance level (Nissen, 2012).

The Internet is a powerful and cost effective tool for communicating information to other people regardless of their location, but it does not replace the need for face-to-face communication in which verbal and nonverbal cues must be observed to ensure communication effectiveness (Clawson, 2012). Most types of information effectively communicated over the Internet like “policy, leadership formulas, and rules are too rigid for today’s world” (Simmons, 2006, p. 196). Clawson (2012) argued that effective leaders employ multiple types of intelligence, which includes valuable social skills. This author points out the importance of observing nonverbal cues to gain greater insight into what is being verbalized and experienced by others. Some internet communications tools do allow for visual and auditory transmissions that can provide additional opportunities to observe verbal and nonverbal cues; however, these tools are not as effective as face-to-face communication in creating safe, creative work environments for exploring options and ideas necessary to solve complex problems. Most virtual communication tools also do not guarantee secure, confidential transmission of information (Clawson, 2012). Patterson (2006) added that virtual communication, like email, is an ineffective way to deal with touchy or controversial issues, such as those issues addressed in multicultural, cross-functional teaming (see also Schein, 2010).

DoD leadership recognizes the importance of face-to-face communication in training acquisition professionals. Acquisition professionals manage a significant percentage of the DoD budget and are required to achieve and maintain acquisition certification levels appropriate to their level of involvement in the defense acquisition process (Kotzian, 2010). Acquisition information is provided in required DAU online classes, but all certification pipelines require one or more resident classes (DAU, 2012). These face-to-face opportunities are facilitated, scenario-based courses that require acquisition workforce personnel to work as productive members of cross-functional teams, sharing ideas, and overcoming differences of opinion to develop solutions to acquisition related problems (Tremaine, 2009).

Achieving consensus and, more importantly, synergy in a team is difficult enough to do face-to-face and can prove nearly impossible using virtual communication techniques (Clawson, 2012). For acquisition training, the DoD overcomes this problem by providing necessary acquisition information in a virtual format and then bringing people together to use what they have learned in a face-to-face, psychologically-safe team environment where members participate in team dialogues to collaboratively problem-solve (Bontis et al., 2011; DAU, 2013). Use of teams to manage acquisition programs is mandated by defense acquisition policies. Use of virtual methods to transmit information is encouraged to realize cost savings; however, the importance of face-to-face communications in a safe environment that explores all options for problem solving is recognized and utilized for DoD acquisition team training (DAU, 2012a). To provide the greatest public value, the DAU must strike a balance between the cost-effective online training that provides lower applied performance and the resource-intensive classroom training that should more readily translate into a higher performing, quality acquisition workforce (Nissen, 2012).

Metrics. Wentling's (2000) qualitative study examined how diverse, multinational organizations evaluated change initiatives and discovered that there is no one best answer to evaluating change implementation. Emphasizing the importance of valuing diversity in a global environment, the author's assertion that change initiative outcomes must be measured to ensure effectiveness and return on investment (ROI) supports my research, which tested whether cross-functional, scenario-based policy training is effective in enhancing policy-compliant behavior. Wentling's study also supports the cross-functional teaming approach, which emphasizes diversity in team makeup to ensure required skill sets and perspectives are represented.

The Government Performance and Results Act of 1993 requires agencies to establish measurable performance indicators to support comparison of actual data values to planned values to assess program performance (Koteen, 1997). The Center for Public

Productivity (2005) argued that outcome measures should report the results, including quality, of the public service provided. To enhance public value, Bryson (2011) emphasized the need to focus on and connect performance measures to key strategic outcomes that benefit users.

Analyzing the *applied training* metric in terms of the ability of acquisition personnel to apply learned policy change knowledge and skills on-the-job will provide greater understanding of whether learning assets enhance policy-compliant behavior that should lead to increased workforce quality, effectiveness, and efficiency (Bontis et al., 2011). The DAU should build on its existing performance measurement approach (Bryson, 2011), which employs on-line postevent and follow-up survey instruments to collect, analyze, and act on student response data on learning achieved, job impact (applied training), business results, and ROI (Bontis et al., 2011). The DAU should revise its strategic management approach as changes occur in the organization's understanding of stakeholder needs and environmental realities (Bryson, 2011).

The Oswalt et al. (2011) article addressed the fundamental premise that an organization survives and provides value within the context of its dynamic and complex external environment. To be successful, organizations must learn to recognize and create value within the existing environment. ROI calculations developed by Oswalt et al. for the DoD provide estimates of change in public value of modeling and simulation efforts over time. ROI metrics for the DoD should determine whether an investment benefit was positive or negative and the magnitude of that positive or negative change (Oswalt et al., 2011).

Unfortunately, data analysts have found that for training programs business results and ROI are difficult, and not cost effective, to calculate due to the complex combination of factors that affect training outcomes (DAU, n.d.; Wilson, 2004). Wilson (2004) explained that the cost of measuring ROI tends to be very high and may outweigh the benefits for most training programs. How value is measured should shape what training is provided in the future to increase value to the organization (Wilson, 2004). This requires a predictive approach to understanding what behavior will facilitate policy compliance, train for that behavior, and then measure the extent to which the behavior is employed (Schein, 2010).

To address increasing complexity in managing acquisition programs in the information age, the DoD acquisition policy requires a cross-functional team approach to leading complex weapon system procurement (USD [AT&L], 2008). DAU training implements the cross-functional team approach to resolving scenario-based problems in the classroom to enhance application of learned behavior in the workplace (Bontis et al., 2011; Kotzian, 2010; Ng'ang'a and Otii's, 2013; Redshaw, 2010; Schein, 2010). The measurement of the value of the team leadership competency outcome will be best "assessed through learning outcomes and behaviors, rather than actual performance impact on the business" (Wilson, 2004, p. 9).

The DAU works to build relationships across acquisition communities, influence process alignment with new policies, reduce acquisition inefficiencies, and provide training and policy updates in support of cross-functional teams to enhance innovation and productivity (DAU, 2013). Increasing innovation through use of cross-functional teams is a key enabler to the DoD's strategy to gain efficiencies while continuing to enhance national security in an increasingly uncertain world (USD [AT&L], 2008). In my study, quantitative measurement data collected by the DAU was analyzed to evaluate student learning outcomes and behaviors following completion of DAU acquisition courses.

Quantitative Methodology for Examining Behavior Change

The quantitative methodology is a deductive approach that tests objective theories using experiments or surveys to examine the relationship between measurable variables (Creswell, 2009, p. 233). This approach aligns well with the empiricism emphasis on empirical investigation as critical to scientific knowledge (Hammersley, 2003) and postpositivism, which emphasizes the importance of multiple measures to attempt to overcome observational fallacies (Trochim, 2006). For this study, the theory was broken down into research questions and hypotheses. The theory was further broken down into variables to be tested through measurement. The data results were used to prove or disprove the theory based on data scores collected using the DAU survey instruments (Bontis et al., 2011: Creswell, 2009). The theory was provided at the beginning of dissertation, in the review of relevant literature in a separate section dedicated to explanation of the basis of the theory, and at the end as the framework for the results when determining whether or not the theory was supported by the study data (Creswell, 2009).

Schein's learning/change model was expanded and provided the framework for my results when determining whether or not the theory was supported by the study data.

The literature review has established that Stage 1 of Schein’s learning/change model has occurred in DoD acquisition. Stage 1 is unfreezing by creating the motivation to change through disconfirmation in the form of scandalous outcome failures, increased survival anxiety due to budgetary crises, and mandated educational experiences that create psychological safety to overcome learning anxiety and promote multicultural communication and teaming. If the theory is to be supported in the DoD setting, the test data should confirm accomplishment of Stage 2 by determining that a significant relationship exist between the study variables, learning and on-the-job application of new concepts, new meanings for old concepts, and new standards for judgment following training, which allows for imitation and identification with acquisition professional role models; emphasizes scanning for solutions to acquisition problems and trial-and-error learning in multicultural teams; and produces successful acquisition outcomes in the learning environment (Schein, 2010). If behavior change is accomplished in the form of on-the-job application of learned acquisition policy in Stage 2, then Stage 3, internalization of these concepts, should lead to culture change, as supported by Schein’s theory and the broader literature.

Monitoring and evaluation of defense acquisition policy implementation efforts are necessary due to the problematic nature of culture change. The implementation strategy may need to be revised to adapt to the rapidly changing environment. The DoD’s strategic plan guided the definition of the performance to be measured, while performance measurement will provide the feedback that keeps the strategic plan on target (Dusenbury, 2000).

Bontis and Serenko's (2009) study employed quantitative, survey methodology that used causal modeling techniques, which allowed assessment and prediction of the effect of organizational strategies on outcome variables, like retention, productivity, and technology usage. These authors argued that an important characteristic of successful organizations is organizational learning, which is often facilitated through formal training programs. Evaluation of formal training programs is critical to ensuring that the required effect is achieved in support of a change initiative. Formal training increases job-relevant knowledge and skills and can enhance organization-personnel relations. An important outcome of formal training is human capital growth, which is positively related to workforce quality (Bontis & Serenko, 2009). Bontis and Serenko demonstrated the importance of knowledge management efforts, which affect retention, relationships, and performance outcomes. The study findings indicate that a strong, positive relationship existed between knowledge generation and process execution. The findings support the argument that newly developed knowledge from formal training enhances effectiveness and efficiency of organizational processes and that strategically managed intellectual capital may be critical for driving organizational performance (Bontis & Serenko, 2009).

Kneipp and Yarandi (2002) provided findings from a quantitative analysis of secondary data, which emphasized the importance of selecting an appropriate sampling design to avoid common problems associated with secondary data analysis. Sample and variance estimation weights and use of Stata or SPSS statistical software programs were recommended for statistical analyses in support of valid and reliable results. Differing analysis techniques were employed to demonstrate the implications on outcomes of using or not using sample and variance estimation weights. Kneipp and Yarandi (2002) argued that weighting became more important in determining statistical significance as the subsamples for parametric analyses became smaller. The differences in observed frequencies and *p* values were relatively large when sampling weights were applied across sample sizes using the nonparametric chi-square test of significance (Kneipp & Yarandi, 2002). Although healthcare data was used, the results were useful in helping me to design my quantitative study using secondary data.

Powell (2006) argued that evaluation research is used to assess programs or policies employing standard research methods for evaluation, special assessment process techniques, or as a specific research method to inform decision-making and practical applications. Evaluation research is typically used to support decision making, addresses research questions about a specific program, is conducted in the real world of the program, and tends to represent a compromise between pure and applied research (Powell, 2006). Tavakol, Gruppen, and Torabi (2010) supported Powell's (2006) definition and application of evaluation research, adding that quantitative and qualitative research methods are used in this type of applied research, which examines the operational effectiveness of a particular program, practice, procedure, or policy.

The DAU is mandated under U.S.C. Title 10 to provide public value by delivering learning assets that should enhance defense acquisition workforce quality. To enhance public value, Bryson (2011) emphasized the need to focus on and connect performance measures to key strategic outcomes that benefit users. To ensure that the DAU's costly learning assets enhance the likelihood of increased workforce effectiveness and efficiency, I measured and analyzed *applied training* in terms of the ability of acquisition personnel to apply policy change knowledge and skills learned in DAU training (Bontis et al., 2011).

Summary and Conclusions

Schein's conceptual and theoretical framework bounds the literature review on DoD acquisitions reform efforts, providing structure for reviewing the history of defense acquisition reform, type of change needed, style of leadership required for change, acquisition policy changes made, and change implementation efforts. Schein's framework is a good fit for examining the challenges faced by the DoD and the defense acquisition workforce in adapting to a rapidly changing environment. Schein (2010) argued that environmental change has been accelerated by globalization and technology, requiring transformative culture change to adapt. Changes in culture, or tacit assumptions, of mature organizations like the DoD cannot, in all likelihood, be successfully implemented and institutionalized directly; however, behavior can be changed by leaders to drive culture change (Burke, 2011; Schein, 2010). The focus of strategic management should, therefore, be on behavior change. Systematic thinking required for analysis of complex interdependencies and cross-cultural teaming inclusive of diverse perspectives are critical to successfully addressing the complexities of the turbulent external environment (Schein, 2010). Schein (2010) posited that multicultural integration requires a psychologically safe, temporary cultural island, which can be provided in an educational setting appropriate for new learning. Crises and scandals can be undeniable, disconfirming events that can start the self-assessment and change processes (Schein, 2010). The three phases of Schein's (2010) change model are unfreeze, cognitive restructuring, and internalize.

The literature describes persistent defense acquisition issues impacting national security and government spending in a rapidly changing environment (Cancian, 2010; Government Accountability Office, 2011; Hearing, 2009; Kotzian, 2010; Kratz & Buckingham, 2010; O'Neil, 2011; Tremaine, 2009); defense acquisition policy changes required to adapt (Fishpaw, 2010; Government Accountability Office, 2010; Hofbauer, Sanders, Ellman, & Morrow, 2011; Redshaw, 2010); the need for behavior change before belief when implementing required DoD cultural change (Burke, 2011; Eide & Allen, 2012; Government Accountability Office, 2012a, 2012b; Schein, 2010); the use of transformative, collaborative leadership techniques to facilitate behavioral change required to enhance the likelihood of successful implementation of complex policy changes (Bass & Riggio, 2010; Boyne & Walker, 2010; Hackman, 2010; Kotzian, 2010; Masciulli, 2011; Messeri & Richards, 2009; van Eeden, Cilliers, & van Deventer, 2008); and the need for metrics to establish acquisition policy implementation effectiveness (Bontis, Hardy, & Mattox, 2011; Government Accountability Office, 2011a, 2011d, 2013b; Hickman, 2010; Nissen, 2012; Wentling, 2000). The 2008 and 2015 defense acquisition policy changes align well with Schein's organizational culture and leadership framework, requiring increased systems thinking through early and more comprehensive systems engineering, increased multicultural integration through enhanced cross-functional teaming; incremental acquisition to reduce the impact of the changing environment; and provision of a psychologically-safe education setting appropriate for new learning for all acquisition workforce members (DoD, 2008, 2013). The large body of literature reviewed provided that the most recent acquisition laws and policies reflect the changes required by Schein's conceptual framework to successfully adapt to the rapidly changing environment. The literature also supports use of transformational, ethical leadership techniques to overcome change-resistance in the defense acquisition workforce (Cooper, 2006; Fieser, 2009).

Implementing the changes in defense acquisition processes and acquisition professional development required by the DoD (DoD, 2008, 2013) and Congressional (Fishpaw, 2010) policies across acquisition programs has been emphasized in DAU formal training to the acquisition workforce (DAU, 2013). Positive trends showing decreases in both overall numbers of major acquisition program and cost relative to the 2011 major programs portfolio were documented in the GAO (2013a, 2014, 2015) annual assessments of DoD weapon system acquisitions. The GAO (2014) report states that the DoD and Congress have made positive strides in improving defense acquisition; however, many acquisition programs continue to fail to meet cost and schedule expectations.

I used Schein's (2010) three-phase model of learning/change to better understand why defense acquisition outcomes continue to fail to meet stakeholder expectations. The first phase is unfreezing. The U.S. economic crisis, with ensuing defense spending debates and budget reductions, have required the DoD to start the self-assessment and change process. New laws and policies have been established to adapt the DoD to this turbulent environment (Eide & Allen, 2012). Policy knowledge and guidance have been articulated in explicit form, such as in policy documents shared via the Internet and were disseminated to the broad defense acquisition audience. Although cost effective, explicit knowledge flow tends to dilute the knowledge in terms of performance enabled by the knowledge (Nissen, 2012). Tacit knowledge flow using techniques like face-to-face training, group interactions, and mentoring has occurred more slowly in the DoD, but the knowledge passed enables knowledge-based action at a significantly higher performance level (Nissen, 2012). The type of tacit knowledge flow provided to all acquisition workforce members is the DAU's formal, face-to-face, classroom training. Formal training conveys an understanding of the changing environment and disconfirms old behaviors to drive unfreezing of the organization. Formal training also drives the second phase of Schein's model by creating cognitive restructuring aligned with policy changes in the acquisition workforce. Yet, the third phase, internalization of the transformative changes driven by policy, has not successfully occurred in the DoD's acquisition workforce (Eide & Allen, 2012). Schein's (2010) argument that behavior must change and these changes must result in more successful outcomes before new beliefs can be internalized is well supported by the literature. Therefore in rapidly changing environments, a phase should be added to Schein's change model following cognitive restructuring and prior to internalization, which is behavior change leading to successful outcomes.

Although formal training is identified as having the greatest potential impact on the acquisition workforce in terms of numbers (Kotzian, 2010; Tremaine, 2009) and DAU training provides significantly better *learning achieved* and *applied training* results than other corporate universities (Bontis et al., 2011), the literature does not address the effectiveness of formal training in creating change in terms of application of learned policy-compliant behavior in the acquisition career fields. My quantitative research addressed this DoD policy change implementation gap in the literature by examining whether DAU collaborative team training enhances policy-compliant behavior required for policy change implementation.

My study used secondary data collected using the DAU’s online survey instruments. I used the Bontis et al. (2011) study to guide my sampling design, which employed a 19-month evaluation period from 1 January 2014 to 30 July 2015. The relationship between *learning achieved* of acquisition policy training and *applied training* (the ability to apply the policy-compliant behavior learned) across multiple acquisition functions was analyzed using statistical techniques (Bontis et al., 2011). The results from my analysis are compared with the Bontis et al. (2011) results. Comparative analyses were also conducted between online policy training and scenario-based, resident training of defense acquisition workforce teams.

Chapter 3: Research Method

The purpose of this quantitative study using ex post facto, cross-sectional and longitudinal survey design was to test the theory that a relationship exists between learning achieved in acquisition policy training and application of learned policy-compliant behavior by the acquisition workforce. My quantitative research question was as follows: To what extent does the Defense Acquisition University's scenario-based policy training of cross-functional acquisition teams enhance policy-compliant behavior of DoD military and civilian personnel? The null hypothesis was either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *learning achieved* from acquisition policy training, and the outcome, ability to apply learned policy-compliant behavior on the job (*applied training*). The research hypothesis provides that there is a significant correlation between *learning achieved* and *applied training* and that *applied training* can be predicted from *learning achieved*.

I selected the ex post facto, cross-sectional and longitudinal survey design because I was unable to cause a variable to occur by creating a treatment and instead examined the effects of DAU training after the training had occurred (Tuckman, 1999). Employing a longitudinal design, I examined participant responses at different points in time in the postevent surveys and the follow-up surveys. My selection of an ex post facto, cross-sectional and longitudinal survey design was driven by my research question, facilitated useful findings, and was supported by available secondary data.

Study Design and Rationale

A study design is a framework that enables resolution of a research problem and guides the various research stages. I used a cross-sectional and longitudinal research design employing quantitative survey methodology to establish variable interrelationships and describe the relationship pattern between variables using a stratified random sampling strategy (Frankfort-Nachmias & Nachmias, 2008). My research tested whether a relationship exists between the outcome variable, *learning achieved*, and predictor variables such as *exercises value* and *examples helped* that incorporated the scenario-based training approach and the cross-functional teaming emphasis concepts. I also tested the relationship between the outcome variable, *applied training*, and predictor variables such as *learning achieved* and *task applicability*.

Research Design

In determining the study design, I assessed the strengths and limitations of the four major types of research designs—experimental, quasi-experimental, cross-sectional, and pre-experimental—and selected a cross-sectional, quantitative design for my research plan. In this section, I discuss my rationale for why the cross-sectional design was more appropriate than other design types for my research question, hypotheses, and variables. To establish that a causal relationship exists between the independent and dependent variables in a study, covariation, nonspuriousness, and time order must be determined for the variables. To make this determination, the research design must compare variables to determine if they covary; manipulate the independent variable to establish time order; control other factors so that they can be ruled out as alternative explanations for dependent variable change; and provide the extent to which the finding can be generalized to the larger population and applied to different settings (Frankfort-Nachmias & Nachmias, 2008).

I examined different research designs to determine the most appropriate design for my study. The experimental research design is the strongest design for showing a causal relationship between research variables. Random samples of the study population are placed into experimental and control groups so that findings can be generalized to the larger population. This design type permits the manipulation of the independent variable and allows for control of other causal factors that may jeopardize internal validity (Frankfort-Nachmias & Nachmias, 2008, p. 110). Experimental design would be an appropriate choice for studying a stimulus-and-response-type variable relationship because the independent variable can be manipulated. My study of a property (human characteristic)-and-disposition (attitude)-type variable relationship in which the independent variable could not be manipulated was not as well suited to experimental investigation (Frankfort-Nachmias & Nachmias, 2008).

A quasi-experimental design employs control and experimental groups, but participants are not randomly assigned to these groups (Creswell, 2012). Frankfort-Nachmias and Nachmias (2008) argued that one strength of the quasi-experimental design is the use of more than one study sample, usually over time and in a natural setting; however, a quasi-experimental design is weaker than an experimental design on internal validity due to the nonrandom group selection and must employ statistical data analysis techniques as a control method.

The cross-sectional research design is a popular choice for interrelating property-disposition variables (Frankfort-Nachmias & Nachmias, 2008). This design often employs survey methodology to establish variable interrelationships or describe the relationship pattern between variables using a random sampling strategy. Cross-sectional designs are weaker in internal validation than experimental or quasi-experimental designs and are more limited in their ability to establish causal relationships between variables because of the inability to make before-and-after variable comparisons and to manipulate the independent variable to show direction of causation. Additionally, there is not adequate control over other factors that could cause dependent variable change. To overcome some of the internal validity problems inherent in this design type, researchers use statistical data analysis techniques to compare data groups and assess the relationship between variables (Frankfort-Nachmias & Nachmias, 2008).

Pre-experimental designs can be employed when experimentation is not possible. This study design allows information to be gathered that may establish the need for further study. A pre-experimental design studies a single group, with no control group for comparison (Creswell, 2012), and does not allow for manipulation of the independent variable. The lack of control of intrinsic and extrinsic internal validity factors means that a causal relationship cannot be determined. Without internal validity, generalizations about the larger population cannot be made (Frankfort-Nachmias & Nachmias, 2008).

A cross-sectional research design was selected for my study to facilitate useful findings. The pre-experimental design would be ineffective in assessing the relationship between variables because of the lack of control of intrinsic and extrinsic internal validity factors (Frankfort-Nachmias & Nachmias, 2008). Without internal validity, generalizing study findings to the larger population cannot be done. Experimental designs or quasi-experimental designs in the natural setting are not practical due to time, budget, and access constraints. It would be difficult to coordinate and resource observation of compliance behavior of a random sample of the acquisition population before and after training. My quantitative research approach used survey methodology to test the hypothesis that the probability of behavioral changes in support of policy compliance increases following DAU training.

Variables

My cross-sectional design and quantitative methodology employed secondary data collected previously by the DAU using an online survey instrument that used a 7-point Likert scale to measure the variables being tested in this study (Bontis et al., 2011). The DAU secondary data contain information that can be measured at ordinal (greater than) and interval (fixed interval) levels (Bontis et al., 2011). The study's theoretical foundation drove the selection of the outcome variables, *learning achieved* and *applied training*. Simple and multiple regression analyses of variables in the acquisition (ACQ) instructor-led training (ILT) and self-paced web training (SPW) samples were used to determine the covariates with greatest effect sizes and, therefore, the greatest potential to be predictors of the outcomes, *learning achieved* and *applied training*. The ACQ samples were used because ACQ courses are required for all functional certification types and should best represent the entire population.

For the *learning achieved* outcome, the potential predictors selected for multiple regression analysis were *career benefit*, *worthwhile investment*, *exercises value*, *examples helped*, *instructor enthusiasm*, *application discussed*, *instructor knowledge*, *delivery effective*, and *graphics meaningful*. The DAU postevent survey data files contain the seven independent (predictor) variables and the dependent (outcome) variable required to calculate the multiple regression. For the *applied training* outcome, the potential predictors selected for multiple regression analysis were *learning achieved*, *task applicability*, *resources provided*, and *manager involvement*. The DAU follow-up survey data files contained the four independent (predictor) variables and the dependent (outcome) variable required to calculate the multiple regression.

To show that a condition or contingency is necessary for the relationship between the independent and dependent variables to occur, I examined whether the relative size or direction of this relationship was more pronounced in covariate subgroups (Frankfort-Nachmias & Nachmias, 2008). These subgroups were broken down by the two training delivery type covariates (ILT and SPW) and the 10 major functional course topic covariates (ACQ, BCF, CM, CON, ENG, LOG, PMT, PQM, STM, and TST) that provide required training for the major defense acquisition functional areas of expertise. All acquisition workforce personnel are required to take online (SPW) and residency (ILT) courses for functional certification represented in these samples and are provided the opportunity to respond to postevent and follow-up surveys.

Methodology

The quantitative survey methodology employed available, reliable survey instruments to measure the study variables. Statistical data analysis using SPSS allowed me to test whether a relationship between variables existed and allowed for generalization about the larger defense acquisition population. The use of a quantitative approach and stratified random sampling of defense acquisition workforce members who had completed DAU courses was expected to allow for useful results that could be generalized to the population being studied.

Participants

Population. Frankfort-Nachmias and Nachmias (2008) argued that content, extent, and time should be used to define a population. The secondary data collected and maintained by the DAU supported data analysis that was designed to generate results that are representative of and can be generalized to the defense acquisition workforce population of approximately 150,000 military and civilian personnel (DAU, 2011; GAO, 2012). All acquisition personnel are required to attend DAU career-field-specific certification training (Fishpaw, 2010). Eligible study participants were defense acquisition workforce members who responded to DAU online surveys following training events between 1 January 2014 and 31 July 2015.

Sampling method. I used probability sampling to provide a sample that was representative of the DAU-trained defense acquisition population. A probability sampling design allowed me to ensure that all units of the defense acquisition population had an equal probability of being included in the sample (Frankfort-Nachmias & Nachmias, 2008). A stratified random sampling technique was the most appropriate for addressing known subset proportions in the DAU secondary data (Field, 2009).

I used a secondary dataset comparable to the dataset used in the Bontis el al. (2011) study, which analyzed more than 300,000 DAU training events from postevent and follow-up survey responses collected during a 19-month period from 1 January 2008 to 30 July 2009. I used a similar 19-month data sample collected from 1 January 2014 to 31 July 2015 to facilitate result comparisons between the Bontis et al. (2009) study and my own. I further divided the sample to avoid biasing inequality by ensuring internal homogeneity of subgroups (Frankfort-Nachmias & Nachmias, 2008).

Sample size. I used the G*Power software tool to calculate sample size for my study (Buchner, Faul, & Erdfelder, n.d.). I conducted an a priori power analysis for a linear multiple regression fixed model with an *R*-squared deviation from zero (null hypothesis *F*-test). The large DAU dataset was divided into subgroups necessary to answer my research question. The a priori type of power analysis was used to determine the appropriate sample size for my regression analysis. Using a large effect size (*F*-squared equal to .35), an alpha of .01, a power of .95, and four predictors, the G*Power software tool provided that I needed a sample size of 49, which is readily supported by the large data set (Buchner, Faul, & Erdfelder, n.d.). To allow for the smaller effect size of some predictors, I changed the input parameter for effect size to small, or .02, for which I needed a sample size of 792, which was still readily supported by the DAU secondary dataset for most subgroups. The findings from this study and from the Bontis et al. (2011) study indicated that the important predictors of *applied training* and *learning* *achieved* had large effect sizes; therefore, all samples were adequately sized for regression analysis.

The Bontis et al. (2011) study helped to establish effect size. Using the predictive learning analytics model to establish key drivers of job impact (called *applied training* in this study) and business results, Bontis et al. reported, “the model predicts 52.7 percent of the job impact in 60 days and 67.9 percent of the business results in 60 days” (p. 358). I used these *R*-squared, or squared multiple correlation, values to calculate Cohen’s *F*-squared to determine how well the outcome studied would be predicted by the regression model (Laureate Education, 2009c). An example of this calculation for this regression model would be *R*-squared divided by one minus *R*-squared (0.527 / 0.473) is *F*-squared (1.11), which is a large effect size. For this study, effect sizes for Cohen’s *F*-squared were interpreted in accordance with Sheperis’s recommendation that .02 be considered a small effect size, .15 be considered a medium effect size, and .35 be considered a large effect size (Laureate Education, 2009b).

Instrumentation

The DAU surveys used to collect the DAU secondary data were designed and piloted by Knowledge Advisors using the Metrics that Matter software in 2004 (DAU, n.d.). Bontis, Hardy, and Mattox (2011) evaluated DAU training and data collection methods using DAU secondary data. They established the validity and reliability of DAU’s online survey instruments, which use a 7-point Likert scale. Frankfort-Nachmias and Nachmias (2008) argued that the Likert scale is “designed to measure the strength of attitudes on the ordinal and internal level” (p. 522). The DAU data set contains information that can be measured at ordinal (greater than) and interval (fixed interval) levels (Bontis, Hardy, & Mattox, 2011). For my study, I analyzed the DAU secondary data collected from the same survey instruments used in the Bontis et al. (2011) survey.

Immediate postevent and 60-day follow-up surveys are conducted. Students provide feedback about course quality and the learning experience. On the follow-up survey, students indicate whether training was applied on the job to contribute to improved job performance and business results. For this study, more than 334,000 evaluations were collected during 19 months between January 1, 2014, and July 31, 2015.

The DAU measured customer satisfaction using the four-level Kirkpatrick model (Level 1: Did they like it? Level 2: Did they learn? Level 3: Do they use it? and Level 4: What were the results?) and addressed the fifth level (What is the return on investment [ROI]?) provided by the Phillips model (Wilson, 2004). Bailey (n.d.) argued,

> because of its appropriateness to the business setting, the evaluation model that emerged from the work of Dr. Donald Kirkpatrick and Dr. Jack Phillips has become the most credible and most widely used training and HRD evaluation methodology in the world. (p. 1)

The DAU survey instruments use a 7-point Likert scale with which the participants respond to statements such as “I learned new knowledge and skills” on a scale from 7 (*strongly agree*) to 1 (*strongly disagree*; Bontis et al., 2011).

The Bontis et al. (2011) study results show validity and reliability of the DAU survey instrument, which uses the Likert scale. For construct reliability, Cronbach’s alpha was calculated to show whether participants accurately interpreted survey item meanings.

The range of Cronbach’s alpha reliability coefficient is usually between 0 and 1, with values closer to 1.0 indicating that scale items have greater internal consistency (Gliem & Gliem, 2003, Panayides, 2013). George and Mallery (2003) provided the following rules of thumb for determining construct reliability: Alpha of .9 and greater is excellent, alpha .8 to .9 is good, alpha .7 to .8 is acceptable, alpha .6 to .7 is questionable, alpha .5 to .6 is poor, and alpha of less than .5 is unacceptable. Although the literature does not agree on the extent of the usefulness of Cronbach’s alpha, there is general agreement in the literature supporting alpha greater than .8 as good and greater than .7 as an adequate measure of construct reliability (Bentler, 2009; Cizek, Rosenberg, & Koons, 2008; Flora & Curran, 2004; Green & Yang, 2009; Liu, Wu, & Zumbo, 2010; Osburn, 2000; Schmitt, 1996; Sijtsma, 2009; Tavako & Dennick, 2011; Zinbarg, Revelle, Yovel, & Li, 2005).

For widely used scales, Carmines and Zeller (1979) argued that the Cronbach’s alpha reliability coefficient should be .8 or greater, because attenuation of correlations due to random measurement error are considered minimal (Carmines & Zeller, 1979). Bontis et al. (2011) found that the measures of reliability for the constructs used to capture DAU survey data were: Instructor effectiveness, alpha .93; courseware quality, alpha .80; worthwhile investment, alpha .97; individual learning, alpha 1.0; perceived future job impact, alpha .83; perceived future business results, alpha .81; job impact in 60 days, alpha .93, and business results in 60 days, alpha .81. The results from the Bontis study ensured accurate and consistent DAU acquisition workforce participant interpretation of survey items’ meanings.

Survey item validity was measured using loading values (lamda) to test whether the items measured what they were supposed to measure. For all cases, the minimum threshold of 0.70 was exceeded (Bollen, 1989; Bontis et al., 2011; Nunnally & Bernstein, 1994). The measures of validity (lamda) for DAU survey items ranged from .75 to 1.0 (Bontis et al., 2011). The psychometric evaluation performed by Bontis et al. (2011) found that DAU measurement instruments used to collect the secondary data set that I analyzed are valid and reliable.

Procedures

DAU secondary data is collected using online postevent and follow-up surveys. The secondary data does not contain personal identification information. Permission to access DAU survey data for research purposes was granted and the Data Use Agreement is attached as Appendix A. My DAU account was established to provide secondary data access.

Statistical Analysis

Prior to SPSS analysis, SPSS was used for data cleaning to examine the secondary data for logical consistency of coding to catch and correct errors (Frankfort-Nachmias & Nachmias, 2008). Descriptive analysis of the secondary data was used to ensure equivalence of groups being studied. Campbell and Stanley (1963) argued that researchers can show experimental isolation through an understanding of rival events that could cause the observed change and discount the likelihood that the rival events caused the change. To test whether a nonspurious relationship exists between the independent and dependent variables, other variables that may lead to alternative explanations for changes in the dependent variable were ruled out (Frankfort-Nachmias & Nachmias, 2008). I examined whether the relative size or direction of this relationship is more pronounced in covariate subgroups (Frankfort-Nachmias & Nachmias, 2008). These subgroups were broken down by the two training delivery type covariates (ILT and SPW) and the 10 major functional course topic covariates (ACQ, BCF, CM, CON, ENG, LOG, PMT, PQM, STM, and TST) that provide required training for the major defense acquisition functional. Statistical methods of control were processes used to rule out other variables that could potentially influencing the changes observed in the dependent variable and invalidate the relationship between the independent and dependent variables. Statistical methods of control employed in my study were simple and multiple regression.

Simple regression. I used simple regression to examine the bivariate relationships of the independent and dependent variables within each subgroup of the ACQ covariate. Frankfort-Nachmias and Nachmias (2008) argued “by dividing the sample into subgroups, the researcher removes the biasing inequality by computing a measure of relationship for groups that are internally homogeneous with respect to the biasing factor” (p. 388). If a nonspurious relationship was found, then the null hypothesis was rejected and the conditions under which this relationship exists was elaborated. Interaction of the other covariates were examined if the size or direction of the association between the independent and dependent variables were greater in one covariate subgroup than another indicating a conditional relationship exists. Lazarsfeld explained that a causal relationship exists if the relationship between the independent and dependent variable does not disappear for any of the covariates tested (as cited in Frankfort-Nachmias & Nachmias, 2008).

Multiple regression. The extent of the linear relationships between the dependent variable and the independent variables can be described by a multiple regression equation (Frankfort-Nachmias & Nachmias, 2008). Multiple regression was used to test the simultaneous effect of my independent and control variables on the dependent variable, *learning achieved*. This method of control was also used to test the extent of the relationship between my independent and control variables, to include *learning achieved*, on the dependent variable, *applied training* (research hypothesis).

Using a linear regression model to test the hypotheses means that a straight line is used to summarize the data set for a predictor (independent variable) and an outcome (dependent variable). The method of least squares was used to establish the line that best describes the data. If the squared differences of the deviations, or residuals, between the line and the data was small then the line was representative. The gradient of the line showed the nature of the relationship between the independent and dependent variables. A line with a positive gradient described a positive relationship, while a negative gradient described a negative relationship (Field, 2009).

For simple regression, if an independent variable significantly predicted the dependent variable outcome, then the gradient of the regression line, or *B*-value, should have been significantly different than zero. The correlation coefficient was used to assess how well this regression model fit the actual data, *R*-squared provided the size of the relationship, and the *F*-ratio indicated prediction improvement due to the regression model compared to model inaccuracy. Once the regression model is established, independent variable values can be plugged into the model to estimate the value of the dependent variable (Field, 2009; Green & Salkind, 2011).

Multiple regression builds on these basic principles, including equation of a straight line, method of least squares, and assessment of model fit to data, to determine if the independent variables can be used to predict the dependent variable. Multiple regression was done using SPSS and the resulting beta values were plugged into an extended equation of a straight line to make predictions about the dependent variable outcome (Green & Salkind, 2011). A hierarchical method of regression was used for selection and entry of independent variables into the model, because previous research was available that determined the importance of independent variables on predicting the outcome (Field, 2009). Independent variables were entered in order of their importance based on the results of the Bontis et al. (2011) study and my bivariate analysis of the ACQ subgroups. Tabulated results at each stage of the hierarchy were reported for the multiple regression that included the standardized betas, their significance, the constant, and general statistics like *R*-squared (squared multiple correlation). By holding the other variables constant, multiple regression made it possible to assess the extent of the change in a dependent variable caused by an independent variable (Field, 2009; Frankfort-Nachmias & Nachmias, 2008).

Using SPSS, the Model Summary and ANOVA tables were used to determine fit of the regression model to the data. The proportion of the variance explained by the model was provided by *R*-squared, which showed model improvement at successive stages of the hierarchical regression analysis. Significant change was indicated by Sig *F* Change values of <.05. The coefficients table for the final model showed whether each independent variable had a significant contribution to predicting the dependent variable (Sig values <.05 are significant). The importance of each independent variable were assessed by examining the standardized beta values for which larger values equate to greater importance (Field, 2009; Green & Salkind, 2011).

Outliers and influential cases were identified and analyzed to determine effect on model accuracy. To further ensure model accuracy, cross-validation was also employed by assessing model accuracy across different samples. The regression model must be unbiased for the findings to be generalized to the broader acquisition workforce population. Unbiased means that on average the sample model and the population model are the same. For this to be true, necessary underlying assumptions must be met. These assumptions include variable types (independent variables are quantitative or categorical and dependent variables are quantitative, continuous, and unbounded); nonzero variance (independent variables); no perfect multicollinearity; homoscedasticity; independent variables are uncorrelated with external variables; independent errors; normally distributed errors; independence (dependent variable values from separate entity); and linearity (Field, 2009; Green & Salkind, 2011). Each of these assumptions was checked using SPSS validation techniques.

Descriptive statistics were used to check the correlation matrix to ensure the multicollinearity assumption was met by determining that the independent variables do not correlate too highly with each other ($R > .9$). Collinearity diagnostics that were also used to check for multicollinearity include eigenvalues, condition indexes, variance proportions, tolerance, and the variance inflation factor (VIF). The VIF indicates whether an independent variable is strongly correlated with other independent variables and the tolerance statistic is 1/VIF. A VIF of 10 or a tolerance value of 0.1 are indicative of serious problems, while a value below 0.2 is cause for concern (Field, 2009).

The Durbin-Watson test tested the independent errors assumption to ensure that observation residual terms are uncorrelated (value should be close to 2). Regression plots were used to check whether independent errors, collinearity, linearity (linear relationship between predictor and outcome), and homoscedasticity (residual variances are the same at each level of the predictors) assumptions were met. The standardized residuals histogram and normal probability plot were used to check the normality of errors assumption (Field, 2009; Green & Salkind, 2011). All assumptions have to be met in order to generalize, or draw conclusions, about the defense acquisition workforce based on a regression analysis performed on a sample data set from defense acquisition personnel.

Validity

The concept of validity for measurement addresses whether researchers are measuring what they think they are measuring. Three types of validity for measurement are content validity, which addresses measuring instrument appropriateness and representation of the qualities being measured; empirical validity, which addresses whether the measuring instrument shows strong correlation between predicted and obtained results; and construct validity, which relates the measuring instrument to a theoretical framework (Frankfort-Nachmias & Nachmias, 2008). Validity for the quantitative research design refers to whether I can draw meaningful and useful inferences from scores on the DAU survey instruments (Creswell, 2009). I was able to draw meaningful inferences from the DAU survey scores using statistical analysis.

Internal threats are research activities that decrease my ability, as a researcher, to make accurate inferences about the population from the data collected. External threats occur when inaccurate inferences are made from the data with regards to persons, settings, or times not represented by the study (Creswell, 2009). Measurement and design validity issues were addressed, ensuring that I actually measured what I thought I was measuring and that meaningful inferences were made from the data collected. The statistical analysis conducted during this study provided useful findings.

Face validity and content validity are issues that were mitigated when employing my sampling method. To have face validity, the instrument must measure what is intended. To mitigate face validity issues, I referenced a previous study by Bontis et al. (2011) that established that the DAU's survey instrument measures what is intended. For content validity, the appropriateness of the variables selected to represent reality for training (variable selected is *learning achieved*) and policy compliance (variable selected is *applied training*) were established when addressing the research question. Content validity was based on my subjective assessment that the DAU survey instrument does appropriately measure the concepts of *learning achieved* of acquisition policy training and *applied training* as a representative variable of application of learned policy-compliant behavior. To meet the requirement that the population be adequately sampled, I used a 19-month period of DAU survey data, which provided more than 334,000 training evaluations. I further established content validity by referencing experts in the field who have examined the DAU survey instruments (Bontis et al., 2011).

Ethical Concerns

Ethical issues in data collection were considered and mitigated to ensure participants are not put at risk. The anonymous quantitative survey data that I used is collected in a DAU database that strips off the student's personally identifiable information and supports data collection from all DAU courses provided to the defense acquisition workforce. My personal bias as an acquisition workforce member and instructor of engineering and program management was set aside.

Summary

In Chapter 3, I provided the study design and rationale; the methodology that included the participants, instrumentation, procedures, statistical analysis, validity, and ethical concerns. My study employed quantitative survey methodology that evaluated if a relationship exists between DAU cross-functional training and policy-compliant behavior change in the defense acquisition workforce following training. My selection of an ex post facto, cross-sectional and longitudinal design was driven by my research question, facilitated useful findings, and was supported by available secondary data. In Chapter 4, I provide the details of the research, discussing the research questions, overarching hypothesis, guiding theory, null and research hypotheses, secondary data description, characteristics of variables, evaluation of regression assumptions, and the results of the multiple regression analysis.

Chapter 4: Results

In Chapter 4, I discuss this study's purpose, research question, overarching hypothesis, guiding theory, null and research hypotheses, secondary data description, characteristics of variables, evaluation of regression assumptions, and results of the multiple regression analysis. The purpose of this quantitative study using ex post facto, cross-sectional and longitudinal survey design was to test the theory that a relationship exists between learning achieved from acquisition policy training and application of learned policy-compliant behavior by the defense acquisition workforce. The test results provided justification for the decision to reject the null hypotheses.

The overarching quantitative research question was the following: To what extent does the Defense Acquisition University (DAU) scenario-based policy training of cross-functional acquisition teams enhance policy-compliant behavior of the Department of Defense (DoD) acquisition workforce personnel? To find the answer to this question, two additional questions were posed: What are the important predictors of learning new concepts and behaviors in DAU training, and what are the important predictors of application of learned concepts and behaviors from DAU training? These research questions were broken down into 13 testable hypotheses that were evaluated using 40 secondary data samples from DAU surveys to provide unbiased representation of survey participant responses.

Theoretical Foundation

Schein's (2010) conceptual three-stage model of learning/change and theory that behavior changes can lead to changes in culture provided the framework for this research.

The first stage of cultural change is unfreezing the organization by creating the motivation to change (Schein, 2010). The literature provided that a rapidly changing environment coupled with crises and scandals creates motivation to change, disconfirms dysfunctional assumptions and behaviors, and builds survival anxiety in the defense acquisition workforce. Formal defense acquisition training reduces learning anxiety by creating a psychologically safe environment and an understanding that a new way of doing business is possible, such as transforming competitive relationships into collaboration and teamwork.

The second stage of cultural change is cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards (Schein, 2010). The literature suggested that the DoD has begun the unfreezing process by changing acquisition policies to drive culture change in response to acquisition program crises driven by a rapidly changing external environment. These changes encourage an internal environment in which cognitive restructuring can come through new learning. Formal training can provide this new learning experience and is required for all acquisition professionals.

The third stage of cultural change is refreezing, or internalizing the new concepts, meanings, and standards by incorporating them into the organization’s identity and relationships. If the new learned behaviors correct problems and produce better outcomes, the new lessons should stabilize, be internalized as new tacit assumptions, and eventually lead to culture change (Schein, 2010).

Table 1

Schein's (2010) Three-Stage Model of Learning/Change

	Schein's three-stage model of learning/change
1	Unfreezing the organization by creating the motivation to change
2	Cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards
3	Refreezing, or internalizing the new concepts, meanings, and standards

For a large, old organization like DoD, a critical step for managing culture change is missing from the three-stage model. Although evolutionary change in organizational culture happens naturally in response to external environment changes, the literature suggested that rapid changes in the DoD's environment are creating disequilibria that have forced transformational change to occur, which in turn challenges deeper cultural assumptions. Schein (2010) argued that existing cultures that have been successful and stable over time cannot be changed directly unless the organization is dismantled, which is not a viable option for the DoD. However, culture change can be launched by behavior change. Changes in behavior that result in better outcomes will encourage personnel to reexamine their beliefs and assumptions and lead them to adopt new beliefs and assumptions. Although culture cannot be directly changed, behavior can be changed by DoD leaders. Behavior change can then start the process of culture change.

An expanded model of culture change was used as the framework for this research. The expanded model (Table 2) adds a stage between Stages 2 and 3 of the three-stage model of learning/change presented by Schein (2010). The additional stage is *applying new behaviors learned to correct problems and produce better outcomes*. The DAU can teach acquisition policy, but the DAU cannot make acquisition professionals learn new policy-compliant behaviors or apply these learned behaviors on the job. This study tested for predictors of both learning new concepts and applying these new concepts in the defense acquisition workplace. Therefore, an expanded culture change model, the behavior-before-belief model of culture change (Table 2), which includes the additional step, applying learned behavior, provided the framework for this research.

Table 2

Behavior-Before-Belief Model of Culture Change, Adapted From Schein (2010)

	Behavior-before-belief model of culture change
1	Unfreezing the organization by creating the motivation to change
2	Cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards
3	Applying new behaviors learned to correct problems and produce better outcomes
4	Refreezing, or internalizing the new concepts, meanings, and standards

Null and Research Hypotheses

Using the behavior-before-belief model of culture change, predictors of Step 2, learning new concepts, and Step 3, applying new behaviors learned, outcomes were tested using statistical analysis of secondary data provided by DAU. The outcome learning new concepts is represented in the data by the variable *learning achieved*. The outcome applying new behaviors learned is represented in the data by the variable *applied training*. Application of learned concepts from DAU policy training was the policy-compliant behavior change tested in this study.

Hypothesis 1

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *career benefit*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *career benefit* and *learning achieved* and that *learning achieved* can be predicted from *career benefit*.

Hypothesis 2

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *worthwhile investment*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *worthwhile investment* and *learning achieved* and that *learning achieved* can be predicted from *worthwhile investment*.

Hypothesis 3

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *exercises value*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *exercises value* and *learning achieved* and that *learning achieved* can be predicted from *exercises value*.

Hypothesis 4

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *examples helped*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *examples helped* and *learning achieved* and that *learning achieved* can be predicted from *examples helped*.

Hypothesis 5 (Instructor-Led Training [ILT] Only)

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *instructor enthusiasm*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *instructor enthusiasm* and *learning achieved* and that *learning achieved* can be predicted from *instructor enthusiasm*.

Hypothesis 6 (ILT Only)

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *application discussed*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *application discussed* and *learning achieved* and that *learning achieved* can be predicted from *application discussed*.

Hypothesis 7 (ILT Only)

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *instructor knowledge*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *instructor knowledge* and *learning achieved* and that *learning achieved* can be predicted from *instructor knowledge*.

Hypothesis 8 (Self-Paced Web [SPW] Only)

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *delivery effective*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *delivery effective* and *learning achieved* and that *learning achieved* can be predicted from *delivery effective*.

Hypothesis 9 (SPW Only)

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *graphics meaningful*, and the outcome, *learning achieved*.

The research hypothesis posits that there is a significant positive correlation between *graphics meaningful* and *learning achieved* and that *learning achieved* can be predicted from *graphics meaningful*.

Hypothesis 10

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is not a correlation, or relationship, between the predictor, *learning achieved*, and the outcome, *applied training*.

The research hypothesis posits that there is a significant positive correlation between *learning achieved* and *applied training* and that *applied training* can be predicted from *learning achieved*.

Hypothesis 11

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is no correlation, or relationship, between the predictor, *task applicability*, and the outcome, *applied training*.

The research hypothesis posits that there is a significant positive correlation between *task applicability* and *applied training* and that *applied training* can be predicted from *task applicability*.

Hypothesis 12

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is no correlation, or relationship, between the predictor, *resources provided*, and the outcome, *applied training*.

The research hypothesis posits that there is a significant positive correlation between *resources provided* and *applied training* and that *applied training* can be predicted from *resources provided*.

Hypothesis 13

The null hypothesis can be either that the correlation coefficient is equal to zero or that the slope weight is equal to zero, which means that there is no correlation, or relationship, between the predictor, *manager involvement*, and the outcome, *applied training*.

The research hypothesis posits that there is a significant positive correlation between *manager involvement* and *applied training* and that *applied training* can be predicted from *manager involvement*.

Data Collection

The secondary data collected and maintained by the DAU provided the data required for my data analysis effort, which was designed to generate results that are representative of and can be generalized to the defense acquisition workforce population of approximately 150,000 military and civilian personnel (DAU, 2011; GAO, 2012). All acquisition personnel are required to attend DAU career-field-specific certification training (Fishpaw, 2010). Eligible study participants were defense acquisition workforce members who responded to DAU online postevent and follow-up surveys following training events during a 19-month period from 1 January 2014 to 31 July 2015. This secondary dataset is comparable to the dataset used in the Bontis el al. (2011) study, which analyzed more than 300,000 DAU training events from online survey responses collected by the DAU during a 19-month period from 1 January 2008 to 30 July 2009. I further divided the 2014-2015 DAU sample of more than 334,000 DAU training events to avoid bias inequality by ensuring internal homogeneity of subgroups (Frankfort-Nachmias & Nachmias, 2008).

Characteristics of Samples

The large DAU dataset was divided into 40 subset samples broken out by postevent or follow-up survey type and for the covariates, delivery type and functional topic. The postevent survey data, collected at the end of each course, supported regression analysis of predictors of the *learning achieved* outcome. The follow-up survey data, collected 60 days post course, provided the data needed for regression analysis of predictors of the *applied training* outcome.

The two training delivery type covariates are instructor-led training (ILT) and self-paced web training (SPW). The 10 functional course topic covariates provide required training for the major defense acquisition functional certifications and included acquisition (ACQ); business, cost estimating, and financial management (BCF); contract management (CM); contracting (CON); engineering (ENG); logistics (LOG); program management (PMT); production, quality and manufacturing (PQM); science and technology management (STM); and test and evaluation (TST). All acquisition workforce personnel are required to take online and residency courses for functional certification represented in these samples and are provided the opportunity to respond to postevent and follow-up surveys. Random sampling techniques were used to provide appropriately sized data samples for analysis, as needed. Multiple samples within the larger data subsets were analyzed, and the SPSS outputs were compared to ensure consistent results.

Variables

The four-stage culture change model drove the selection of the outcome variables, *learning achieved* and *applied training*, for this study. Simple and multiple regression analyses of variables in the ACQ ILT and SPW samples were used to determine the covariates with greatest effect sizes and, therefore, the greatest potential to be predictors of the outcomes, *learning achieved*, and *applied training*. The ACQ samples were used because ACQ courses are required for all functional certification types and best represent the entire population. To reduce the risk of multicollinearity, two variables measuring different aspects of the worthwhile, curriculum, and instructor constructs were selected.

For the *learning achieved* outcome, the potential predictors selected for multiple regression analysis were: *career benefit*, *worthwhile investment, exercises value*, *examples helped*, *instructor enthusiasm*, *application discussed*, *instructor knowledge, delivery effective,* and *graphics meaningful*. The DAU postevent survey data files contain the seven independent (predictor) variables and the dependent (outcome) variable required to calculate the multiple regression. The outcome, *learning achieved*, was operationalized by the statement, “I learned new knowledge and skills.”

The predictor, *career benefit*, was operationalized by the statement, “I will benefit from what I learned in the course for my career/professional development.” The predictor, *worthwhile investment*, was operationalized by the statement, “this training was a worthwhile investment for my employer." The predictor, *exercises value*, was operationalized by the statement, "the exercises added value to my learning." The predictor, *examples helped*, was operationalized by the statement, "the examples presented helped me understand the content." The predictor, *instructor enthusiasm*, was operationalized by the statement, "the instructor's energy and enthusiasm kept the participants actively engaged." The predictor, *application discussed*, was operationalized by the statement, "on-the-job application of each class objective was discussed during the course."

The predictor, *instructor knowledge*, was operationalized by the statement, "the instructor was knowledgeable about the subject." The predictor, *delivery effective*, was operationalized by the statement, "this delivery method was an effective way for me to learn the material." The predictor, *graphics meaningful*, was operationalized by the statement, "the graphics and illustrations used were meaningful and within context." The units for all the variables were Likert scale scores measured 7 (strongly agree) to 1 (strongly disagree).

For the *applied training* outcome, the potential predictors selected for multiple regression analysis are *learning achieved*, *task applicability*, *resources provided*, and *manager involvement*. The DAU follow-up survey data files contained the four independent (predictor) variables and the dependent (outcome) variable required to calculate the multiple regression. The outcome, *applied training*, was operationalized by the statement, "I have been able to successfully apply the knowledge/skills learned in this class to my job."

The predictor *learning achieved* was operationalized by the statement, “I learned new knowledge and skills from this training.” The predictor *task applicability* was operationalized by the question, “what percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?” The predictor *resources provided* was operationalized by the statement, “I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.” The predictor *manager involvement* was operationalized by the statement, “after training, my manager and I discussed how I will use the learning on my job.” The units for all the variables, except *task applicability*, were Likert scale scores measured 7 (strongly agree) to 1 (strongly disagree). The *task applicability* units were percentage.

Study Results

I used IBM SPSS Statistics 21 to perform multiple regression analyses on the DAU postevent and follow-up survey data samples to test whether the outcome, *learning achieved*, and the outcome, *applied training*, can be predicted by a linear combination of multiple predictor variables. Regression was used to find the best-fitting straight line, or regression line, for the DAU data set. The regression line was then used to predict the outcome value from the value of the predictor variables (Field, 2009).

The regression model must be unbiased for the findings to be generalized to the broader acquisition workforce population, which means that on average the sample and the population models would be the same. To be sure that this is true, necessary underlying assumptions must be met. These assumptions include variable types (independent variables are quantitative or categorical and dependent variables are quantitative, continuous, and unbounded), nonzero variance (independent variables), no perfect multicollinearity, homoscedasticity, independent variables are uncorrelated with external variables, independent errors, normally distributed errors, independence (dependent variable values from separate entity), and linearity (Field, 2009; Green & Salkind, 2011). Each of these assumptions was checked using SPSS validation techniques and these assumptions were met as described in this chapter. This means the regression model from the sample is the same, on average, as the regression model from the population (Field, 2009). A comprehensive analysis of the multiple regression results from the 40 samples was performed. Tables and figures from representative samples are provided to illustrate the analysis process, as well as a summary table of important findings from all data subsets.

A priori power analysis was used to determine the appropriate sample size for the linear multiple regression analysis. Using a large effect size (*F*-squared equal to .35), an alpha of .01, a power of .95, and four to seven predictors, the G*Power software tool indicated that I needed a sample size of 49, which was exceeded by all samples. By changing the input parameter for effect size to small, or .02, I needed a sample size of 792, which was reached in most of the samples. Data subsets and random sampling techniques were used to provide samples with an upper sample size limit of no more than three times the minimum sample size of 792 (Buchner et al., n.d.). The findings from this study and from the Bontis et al. (2011) study found that the important predictors of *applied training* and *learning achieved* have large effect sizes, therefore all samples were adequately sized for regression analysis.

Analysis (Part 1): Predictors of Learning Achieved

Descriptive statistics (Tables 3 and 4) characterize the 20 samples used for the analysis of Step 2 of the behavior-before-belief model of culture change to determine important predictors of the *learning achieved* outcome for both the ILT and SPW DAU courses. The descriptive statistics include mean, standard deviation, and sample size. The means of the Likert score (7 = strongly agree and 1 = strongly disagree) responses to the variables indicated how the students in each sample perceived the variable in question. The means of the *learning achieved* outcome for resident ILT courses ranged from a low of 5.76 for ENG to a high of 6.53 for CM. For online SPW courses, the means for *learning achieved* ranged from a low of 5.38 for ENG to a high of 5.88 for CM. These findings indicate resident ILT courses may be more effective in achieving learning than online SPW courses.

For the resident ILT courses (Table 3), the instructor variables tend to have the highest mean scores even though regression analysis results provided in this chapter indicated that the instructor variables are the least important predictors of learning. The variables that measured how worthwhile the training was tended to have the lowest mean scores even though analysis shows them to be the most important predictors of learning. Table 4 provides that the online courses showed similar results with the most important predictors of learning being scored the lowest on the postevent surveys.

Table 3

Descriptive Statistics (ILT)

Postevent survey data	ACQ (*N* = 1826)		BCF (*N* = 1474)		CM (*N* = 1668)		CON (*N* = 2000)		ENG (*N* = 1484)	
Instructor-led training	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
I learned new knowledge and skills.	6.36	1.036	6.10	1.193	6.53	.852	6.42	.988	5.76	1.276
I will benefit from what I learned in the course for my career/professional development.	6.05	1.379	5.86	1.427	6.49	.889	6.29	1.105	5.57	1.454
This training was a worthwhile investment for my employer.	6.02	1.527	5.84	1.559	6.49	1.014	6.28	1.251	5.49	1.638
The exercises added value to my learning.	6.58	.814	6.36	1.030	6.32	1.166	6.39	1.061	5.98	1.272
The examples presented helped me understand the content.	6.59	.750	6.37	.965	6.51	.875	6.46	.934	6.09	1.143
The instructor's energy and enthusiasm kept the participants actively engaged.	6.79	.584	6.66	.782	6.70	.744	6.60	.878	6.51	.855
On-the-job application of each class objective was discussed during the course.	6.15	1.226	5.97	1.310	6.52	.827	6.29	1.067	5.81	1.224
The instructor was knowledgeable about the subject.	6.84	.467	6.79	.508	6.77	.618	6.77	.605	6.65	.698
Postevent survey data	LOG (*N* = 1489)		PMT (*N* = 1847)		PQM (*N* = 1832)		STM (*N* = 878)		TST (*N* = 1213)	
Instructor-led training	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
I learned new knowledge and skills.	6.17	1.183	6.38	.964	6.26	1.051	5.82	1.240	6.03	1.198
I will benefit from what I learned in the course for my career/professional development.	5.86	1.509	6.33	1.034	6.01	1.250	5.78	1.288	5.97	1.280
This training was a worthwhile investment for my employer.	5.88	1.623	6.35	1.162	6.05	1.352	5.73	1.502	5.88	1.526
The exercises added value to my learning.	6.40	1.006	6.41	.948	6.56	.778	6.14	1.109	6.39	1.028
The examples presented helped me understand the content.	6.47	.912	6.47	.855	6.60	.702	6.28	.981	6.46	.939
The instructor's energy and enthusiasm kept the participants actively engaged.	6.81	.564	6.66	.733	6.76	.569	6.55	.847	6.66	.746
On-the-job application of each class objective was discussed during the course.	6.02	1.337	6.28	1.002	6.05	1.167	5.94	1.184	6.13	1.120
The instructor was knowledgeable about the subject.	6.82	.499	6.70	.630	6.80	.492	6.65	.681	6.78	.560

Table 4

Descriptive Statistics (SPW)

Postevent survey data Self-paced web	ACQ(*N*=1532) Mean	Std. Deviation	BCF(*N*=1366) Mean	Std. Deviation	CM(*N*=1462) Mean	Std. Deviation	CON(*N*=1588) Mean	Std. Deviation	ENG(*N*=1417) Mean	Std. Deviation
I have learned new knowledge skills from this training	5.64	1.365	5.60	1.369	5.88	1.218	5.73	1.286	5.38	1.405
I will benefit from what I learned in the course for my career/professional development.	5.56	1.452	5.69	1.408	6.14	1.082	5.88	1.265	5.54	1.394
This training was a worthwhile investment for my employer.	5.39	1.631	5.68	1.508	6.17	1.157	5.87	1.340	5.44	1.536
The exercises added value to my learning.	5.75	1.342	5.88	1.224	6.28	.962	5.93	1.215	5.70	1.299
The examples presented helped me understand the content.	5.81	1.260	5.86	1.238	6.34	.895	5.92	1.202	5.78	1.230
This delivery method was an effective way for me to learn the material.	5.55	1.513	5.74	1.367	6.22	1.065	5.81	1.296	5.65	1.402
The graphics and illustrations used were meaningful and within context.	5.64	1.368	5.86	1.192	6.33	.916	5.84	1.234	5.79	1.251

Postevent survey data Self-paced web	LOG(*N*=1558) Mean	Std. Deviation	PMT(*N*=1377) Mean	Std. Deviation	PQM(*N*=1401) Mean	Std. Deviation	STM(*N*=0) Mean	Std. Deviation	TST(*N*=1371) Mean	Std. Deviation
I have learned new knowledge skills from this training	5.40	1.438	5.45	1.324	5.52	1.294			5.70	1.223
I will benefit from what I learned in the course for my career/professional development.	5.43	1.532	5.71	1.293	5.72	1.270			5.88	1.151
This training was a worthwhile investment for my employer.	5.41	1.674	5.72	1.400	5.69	1.398			5.80	1.281
The exercises added value to my learning.	5.66	1.365	5.74	1.280	5.93	1.112			5.94	1.163
The examples presented helped me understand the content.	5.78	1.261	5.83	1.175	6.00	1.059			6.03	1.008
This delivery method was an effective way for me to learn the material.	5.65	1.385	5.65	1.402	5.94	1.175			5.91	1.242
The graphics and illustrations used were meaningful and within context.	5.75	1.283	5.84	1.165	5.98	1.090			5.95	1.099

The SPSS correlation matrix for each sample is a starting point for exploring the relationships between predictors and the outcome and for an initial check for multicollinearity. The correlation matrix (Table 5) showed the value of Pearson’s correlation coefficient between variable pairs. The one-tailed significance of each correlation is highly significant, $p < .001$. No collinearity was found in the data, because there were no substantial correlations ($r > .9$) between predictors. However, two variables measuring different aspects of a construct have been used to provide additional depth of understanding and may cause multicollinearity concerns.

The worthwhile, or value of training, construct is measured by the variables *career benefit* for the student and *worthwhile investment* for the employer. Although these variables measure different aspects of why the training is worthwhile, their correlation is relatively high ($r = .833$). The *exercises value* and *examples helped* predictors ($r = .801$) and the *instructor enthusiasm* and *instructor knowledge* predictors ($r = .729$) also measure different aspect of the same constructs (curriculum and instructor constructs, respectively). In the DAU curriculum, examples provide context for learning typically in the form of scenarios, while exercises in residency ILT courses are collaborative, hands on, scenario-based efforts typically conducted in teams of six students. Online SPW exercises provide a scenario-based, hands on experience, but do not support collaborative teaming.

Table 5

Correlation Matrix (ACQ ILT)

		I learned new knowledge and skills	I will benefit from what I learned in the course for my career/pro-fessional develop-ment	This training was a worth-while investment for my employer	The exercises added value to my learning	The examples presented helped me understand the content	The instructor's energy and enthusiasm kept the participants actively engaged	On-the-job applica-tion of each class objective was discussed during the course	The instruct-tor was know-ledgeable about the subject
Pearson correla-tion	I learned new knowledge and skills.	1.000	.643	.587	.625	.576	.331	.542	.299
	I will benefit from what I learned in the course for my career/professional development.	.643	1.000	.833	.527	.501	.248	.694	.200
	This training was a worthwhile investment for my employer.	.587	.833	1.000	.511	.462	.257	.638	.203
	The exercises added value to my learning.	.625	.527	.511	1.000	.801	.349	.499	.342
	The examples presented helped me understand the content.	.576	.501	.462	.801	1.000	.409	.506	.410
	The instructor's energy and enthusiasm kept the participants actively engaged.	.331	.248	.257	.349	.409	1.000	.317	.729
	On-the-job application of each class objective was discussed during the course.	.542	.694	.638	.499	.506	.317	1.000	.264
	The instructor was knowledgeable about the subject.	.299	.200	.203	.342	.410	.729	.264	1.000
Sig. (1-tailed)	I learned new knowledge and skills.	.	.000	.000	.000	.000	.000	.000	.000
	I will benefit from what I learned in the course for my career/professional development.	.000	.	.000	.000	.000	.000	.000	.000
	This training was a worthwhile investment for my employer.	.000	.000	.	.000	.000	.000	.000	.000
	The exercises added value to my learning.	.000	.000	.000	.	.000	.000	.000	.000

(table continues)

	I learned new knowledge and skills	I will benefit from what I learned in the course for my career/pro-fessional development	This training was a worthwhile investment for my employer	The exercises added value to my learning	The examples presented helped me understand the content	The instructor's energy and enthusiasm kept the participants actively engaged	On-the-job application of each class objective was discussed during the course	The instructor was knowledgeable about the subject
The examples presented helped me understand the content.	.000	.000	.000	.000	.	.000	.000	.000
The instructor's energy and enthusiasm kept the participants actively engaged.	.000	.000	.000	.000	.000	.	.000	.000
On-the-job application of each class objective was discussed during the course.	.000	.000	.000	.000	.000	.000	.	.000
The instructor was knowledgeable about the subject.	.000	.000	.000	.000	.000	.000	.000	.

The findings confirmed that out of the six or seven predictors across all data subsets, the *career benefit* variable correlates best with the outcome ($p < .001$), so this variable should best predict *learning achieved*. This finding supports the Bontis et al. (2011) study which found the strongest driver of learning in DAU courses was whether the student believed that the training was worthwhile. I chose the hierarchical method for variable entry into the model, so summary statistics were repeated for each hierarchy stage. In the Model Summary (Table 6), the first model represents the first hierarchy stage, which included only the predictors *career benefit* and *worthwhile investment*. The second model added the predictors *exercises value* and *examples helped*. The third model used all predictors.

The SPSS model summaries (Tables 6 and 7) provided the multiple correlation coefficient (R) between the predictors and the outcome and the value of R-square, which measured how much of the outcome variability is accounted for by the predictors (Field, 2009). Model 1 has only the *career benefit* and *worthwhile investment* predictors included and the *R*-square values for all samples ranged from a high of .695 for LOG SPW to as little as .422 for ACQ ILT, which means that for all samples *career benefit* and *worthwhile investment* accounted for between 42% and 70% of the variation in *learning achieved* depending on functional topic and delivery method. However, when the *exercises value* and *examples helped* predictors are included in model 2, this value increases to as much as .721 or 72% (LOG SPW), and as little as .533 or 53% (ACQ ILT) of the variance in *learning achieved*. When the remaining predictors are added in Model 3, this value increases only slightly to 73% for LOG SPW and 54% for ACQ ILT. These findings indicate that the predictors specific to the training delivery type account for 1% or less of the variability in the outcome, *learning achieved*. The predictors specific to the ILT delivery type are *instructor enthusiasm*, *application discussed*, and *instructor knowledge*. The predictors specific to the SPW delivery type are *delivery effective* and *graphics meaningful*.

Table 6

Model Summary (LOG SPW)

Model summary[d]										
Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate	Change statistics					Durbin-Watson
					R square change	*F* change	df1	df2	Sig. *F* change	
1	.834[a]	.695	.694	.795	.695	1770.163	2	1555	.000	
2	.849[b]	.721	.721	.760	.027	74.193	2	1553	.000	
3	.855[c]	.732	.731	.746	.010	29.726	2	1551	.000	2.141

[a]Predictors (Constant): This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development.
[b]Predictors (Constant): This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning.
[c]Predictors (Constant): This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning. This delivery method was an effective way for me to learn the material. The graphics and illustrations used were meaningful and within context.
[d]Dependent variable: I have learned new knowledge skills from this training.

Table 7

Model Summary (ACQ ILT)

Model summary[d]										
Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate	Change statistics					Durbin-Watson
					R square change	*F* change	df1	df2	Sig. *F* change	
1	.650[a]	.422	.422	.788	.422	665.903	2	1823	.000	
2	.730[b]	.533	.532	.708	.111	217.188	2	1821	.000	
3	.735[c]	.541	.539	.703	.007	9.743	3	1818	.000	1.933

[a]Predictors (Constant): This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development.
[b]Predictors (Constant): This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning.
[c]Predictors (Constant): This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning. The instructor was knowledgeable about the subject. On-the-job application of each class objective was discussed during the course. The instructor's energy and enthusiasm kept the participants actively engaged.
[d]Dependent variable: I learned new knowledge and skills.

The adjusted *R*-square was analyzed for all subsets and gives some idea of how well the model can be generalized to the defense acquisition workforce population. For all samples, the adjusted *R*-square value was the same, or close to, the value of *R*-square, meaning that testing the population model instead of a sample model would account for the same outcome variance (Green & Salkind, 2011). The change statistics described the difference made when new predictors were added to the model by reporting whether the change in *R*-square is significant. This was tested using an *F*-ratio and the change in *F* was analyzed. For the ENG SPW sample (Table 8), model 1 caused *R*-square to change from 0 to .607. This change in variance leads to an *F*-ratio of 1093.256, which is highly significant ($p < .001$). The addition of the *exercises value* and *examples helped* predictors (Model 2) causes *R*-square to increase by .010. The addition of the remaining delivery type specific predictors (Model 3) causes *R*-square to increase by .007. The variance change that can be explained by the additional predictors leads to an *F*-ratio of 17.768 and 13.282, which are again highly significant ($p < .001$). This was the case for all data samples.

Table 8

Model Summary (ENG SPW)

Model summary[d]										
Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate	Change Statistics					Durbin-Watson
					R square change	*F* change	df1	df2	Sig. *F* change	
1	.779[a]	.607	.607	.881	.607	1093.256	2	1414	.000	
2	.785[b]	.617	.616	.871	.010	17.768	2	1412	.000	
3	.790[c]	.624	.622	.863	.007	13.282	2	1410	.000	2.066

[a]Predictors: (Constant), This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development.
[b]Predictors: (Constant), This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning.
[c]Predictors: (Constant), This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning. This delivery method was an effective way for me to learn the material. The graphics and illustrations used were meaningful and within context.
[d]Dependent variable: I have learned new knowledge skills from this training.

The Durbin-Watson statistic was analyzed to determine whether the assumption of independent errors is correct, which means that observation residual terms are uncorrelated. A conservative rule suggests that values less than 1 or greater than 3 could be problematic (Field, 2009). The value should be close to 2. The value for the ENG SPW data (Table 8) is 2.066, which is close enough to 2 that the assumption has likely been met. All of the samples met this criterion; therefore, the assumption of independent errors is tenable.

The SPSS ANOVA (Table 9) provides the variance analysis to test whether the regression model is better than using the mean to predict the outcome. For ENG SPW, the ANOVA in Table 7 shows that Model 1 has 1414, Model 2 has 1412, and Model 3 has 1410 degrees of freedom. The average sum of squares (MS) and the *F*-ratio were calculated. $F > 1$ provides that the improvement brought about by the model outweighs the model inaccuracy. Model 1 had an *F*-ratio of 1093.256 ($p < .001$), the value of *F* for model 2 is 568.477 ($p < .001$), and the value of *F* for Model 3 is 390.005 ($p < .001$). This means all three models are highly significant and that it is very unlikely for these values to have happened by chance. This was the case for all samples. I found that use of the model provided significant improvement in my ability to predict the outcome variable, *learning achieved,* over using the mean as an estimate of *learning achieved*. These findings mean that the null hypothesis that no relationship exists should be rejected (Field, 2009).

Table 9

ANOVA (ENG SPW)

ANOVA[a]						
Model		Sum of squares	Df	Mean square	F	Sig.
	Regression	1697.642	2	848.821	1093.256	.000[b]
1	Residual	1097.851	1414	.776		
	Total	2795.493	1416			
	Regression	1724.594	4	431.148	568.477	.000[c]
2	Residual	1070.899	1412	.758		
	Total	2795.493	1416			
	Regression	1744.396	6	290.733	390.005	.000[d]
3	Residual	1051.097	1410	.745		
	Total	2795.493	1416			

[a]Dependent variable: I have learned new knowledge skills from this training
[b]Predictors: (Constant), This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development.
[c]Predictors: (Constant), This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning.
[d]Predictors: (Constant), This training was a worthwhile investment for my employer. I will benefit from what I learned in the course for my career/professional development. The examples presented helped me understand the content. The exercises added value to my learning. This delivery method was an effective way for me to learn the material. The graphics and illustrations used were meaningful and within context.

The SPSS coefficients table (Table 10) shows the model parameters for each step in the hierarchy. The first step in the hierarchy included *career benefit* and *worthwhile investment*. For ACQ SPW, SPSS results provide that *B* (Y intercept constant) is 1.678 and this can be interpreted as meaning that when no benefit to career or employer occurs (when X = 0), the model predicts very low *learning achieved* scores will result. The *B* values of .449 for *career benefit* and .271 for *worthwhile investment* represent the outcome change associated with a unit change in the predictor. If the predictor variable is increased by one on the Likert scale for *career benefit*, then the model predicts that *learning achieved* increases by 0.449 on the Likert scale following acquisition web-based training of acquisition professionals.

These results indicate that the regression model is useful, because it significantly improves the ability to predict learning from defense acquisition policy training. To use Model 3 (Table 10) to make predictions for ACQ SPW, I would define the model as:

learning achieved = 0.945 + (0.308career) + (0.187worthwhile) + (0.079exercises) + (0.107examples) + (0.111delivery)

For comparison, the model for ACQ ILT (Table 11) would be defined as:

learning achieved = -0.027 + (0.253career) + (0.044worthwhile) + (0.374exercises) + (0.109examples) + (0.100enthusiasm) + (0.047application)

This allows a prediction about *learning achieved* for online SPW and resident ILT acquisition courses to be made by replacing the predictors with values of interest.

Table 10

Coefficients (ACQ SPW)

Model		Unstandardized coefficients *B*	Unstandardized coefficients Std. error	Standardized coefficients Beta	t	Sig.	95.0% Confidence interval for *B* Lower bound	95.0% Confidence interval for *B* Upper bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity statistics Tolerance	Collinearity statistics VIF
1	(Constant)	1.678	.089		18.876	.000	1.504	1.853					
	I will benefit from what I learned in the course for my career/professional development.	.449	.027	.477	16.345	.000	.395	.503	.745	.386	.268	.316	3.165
	This training was a worthwhile investment for my employer.	.271	.024	.324	11.093	.000	.223	.319	.719	.273	.182	.316	3.165
2	(Constant)	1.044	.104		10.047	.000	.840	1.248					
	I will benefit from what I learned in the course for my career/professional development.	.318	.029	.338	10.951	.000	.261	.375	.745	.270	.173	.263	3.809
	This training was a worthwhile investment for my employer.	.218	.024	.260	9.045	.000	.171	.265	.719	.226	.143	.301	3.317
	The exercises added value to my learning.	.128	.034	.125	3.725	.000	.060	.195	.673	.095	.059	.220	4.541
	The examples presented helped me understand the content.	.158	.035	.146	4.545	.000	.090	.226	.656	.116	.072	.244	4.103
3	(Constant)	.945	.105		9.031	.000	.740	1.151					
	I will benefit from what I learned in the course for my career/professional development.	.308	.029	.328	10.746	.000	.252	.365	.745	.265	.168	.262	3.821
	This training was a worthwhile investment for my employer.	.187	.024	.224	7.709	.000	.140	.235	.719	.194	.120	.289	3.463
	The exercises added value to my learning.	.079	.035	.078	2.283	.023	.011	.147	.673	.058	.036	.210	4.772
	The examples presented helped me understand the content.	.107	.036	.099	2.960	.003	.036	.178	.656	.076	.046	.219	4.558
	This delivery method was an effective way for me to learn the material.	.111	.023	.123	4.856	.000	.066	.156	.631	.123	.076	.378	2.646
	The graphics and illustrations used were meaningful and within context.	.048	.026	.048	1.875	.061	-.002	.098	.590	.048	.029	.370	2.699

[a]Dependent Variable: I have learned new knowledge skills from this training.

For the ACQ ILT model (Table 11), the *career benefit* (*t*(1818) = 10.692, *p* < .001), *worthwhile investment* (*t*(1818) = 2.212, *p* < .05), *exercises value* (*t*(1818) = 10.640, *p* < .001), *examples helped* (*t*(1818) = 2.831, *p* < .01), *instructor enthusiasm* (*t*(1818) = 2.380, *p* < .05), *application discussed* (*t*(1818) = 2.376, *p* < .05), and *instructor knowledge* (*t*(1818) = 1.253, not sig.) are all significant predictors of *learning achieved*, except for *instructor knowledge*. The magnitude of the *t*-statistics indicates that the *career benefit* and *exercises value* predictors had the greatest impact and that *instructor knowledge* had no significant impact on the *learning achieved* outcome. Although all course topic and delivery combination results provided that *career benefit* was the most important predictor, the other predictors varied greatly in their importance in predicting *learning achieved* in DAU classes across delivery types and functional topics.

For ACQ ILT (Table 11), the standardized beta values for *career benefit* (Beta = .336) and *exercises value* (Beta = .293) are more than three times that of any other predictor and are, therefore, of much greater importance than any of the other variables in the model. The unstandardized *B*-values confidence intervals contain the true *B* value for 95% of samples. Confidence intervals that do not cross zero indicate that the model estimates should represent the values of the true population. Most of the ACQ ILT model predictors have relatively tight confidence intervals that do not cross zero; however, the *instructor knowledge* predictor confidence interval does cross zero, which supported the finding that this variable is not a significant predictor of *learning achieved* for the ACQ ILT model.

Table 11

Coefficients (ACQ ILT)

Coefficients[a]

Model		Unstandardized coefficients		Standardized coefficients	*t*	Sig.	95.0% confidence interval for *B*		Correlations			Collinearity statistics	
		B	Std. Error	Beta			Lower bound	Upper bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3.394	.083		40.644	.000	3.230	3.557					
	I will benefit from what I learned in the course for my career/professional development.	.377	.024	.502	15.607	.000	.330	.425	.643	.343	.278	.306	3.267
	This training was a worthwhile investment for my employer.	.115	.022	.169	5.250	.000	.072	.157	.587	.122	.093	.306	3.267
2	(Constant)	.812	.150		5.412	.000	.517	1.106					
	I will benefit from what I learned in the course for my career/professional development.	.269	.022	.358	11.983	.000	.225	.313	.643	.270	.192	.288	3.474
	This training was a worthwhile investment for my employer.	.055	.020	.082	2.789	.005	.016	.094	.587	.065	.045	.299	3.348
	The exercises added value to my learning.	.380	.035	.298	10.751	.000	.311	.449	.625	.244	.172	.332	3.008
	The examples presented helped me understand the content.	.166	.037	.120	4.436	.000	.093	.239	.576	.103	.071	.350	2.860
3	(Constant)	-.027	.249		-.110	.912	-.515	.461					
	I will benefit from what I learned in the course for my career/professional development.	.253	.024	.336	10.692	.000	.206	.299	.643	.243	.170	.255	3.919
	This training was a worthwhile investment for my employer.	.044	.020	.065	2.212	.027	.005	.083	.587	.052	.035	.293	3.412
	The exercises added value to my learning.	.374	.035	.293	10.640	.000	.305	.443	.625	.242	.169	.332	3.013
	The examples presented helped me understand the content.	.109	.039	.079	2.831	.005	.034	.185	.576	.066	.045	.323	3.097
	The instructor's energy and enthusiasm kept the participants actively engaged.	.100	.042	.057	2.380	.017	.018	.183	.331	.056	.038	.446	2.242

table continues

On-the-job application of each class objective was discussed during the course.	.047	.020	.055	2.376	.018	.008	.085	.542	.056	.038	.469	2.132
The instructor was knowledgeable about the subject.	.066	.052	.030	1.253	.210	-.037	.169	.299	.029	.020	.452	2.214

[a]Dependent variable: I learned new knowledge and skills.

The SPSS coefficients table provided the collinearity measures, the VIF and tolerance statistics. Field (2009) argued that there would have been cause for concern if the VIF was greater than 10, which it was not. The regression might have been considered biased if the average VIF was significantly greater than 1, which it was not. A serious problem may have been indicated if the tolerance was below 0.1, which it was not. A potential problem may have been indicated if the tolerance was below 0.2, which it was not.

The coefficients tables for the samples showed no collinearity in the data. The VIF values for all samples were well less than 10 indicating no cause for concern. The average VIF values were not substantially greater than 1, so the regression is assumed to be unbiased. No tolerance values fell below 0.2. Based on these results, I concluded that there is not a collinearity problem within the data. Although it would be preferable if the average VIF was was closer to 1, these results support a conclusion that collinearity is not evident in this model. Analyses of all samples produced similar results.

The collinearity diagnostics (Table 12) provided eigenvalues of the cross-products matrix, condition indexes, and variance proportions. The collinearity diagnostics data was analyzed to determine whether the same dimensions, or eigenvalues, had large predictor variance proportions, since the variance proportions for each predictor should be distributed across different eigenvalues. For the BCF SPW model, each predictor has much of its variance loading on the same dimensions. *Career benefit* has 64% of variance and *worthwhile investment* has 69% of variance on dimension 5, which is not unexpected since both are measures of training value, one for the student and one for the employer. The correlation between these predictors from Table 3 was .833, which is less than .9; however, this value is high enough coupled with the collinearity diagnostics findings to raise a concern regarding multicollinearity in this sample. Exercises and examples variance loading are also on the same dimension, which may indicate that the *exercises value* and *examples helped* predictors are similar constructs that also lead to some concerns regarding multicollinearity for most of these samples.

Table 12

Collinearity Diagnostics (BCF SPW)

Collinearity diagnostics[a]										
Model	Dimension	Eigen value	Condition index	Variance proportions						
				(Constant)	I will benefit from what I learned in the course for my career/professional development	This training was a worthwhile investment for my employer	The exercises added value to my learning	The examples presented helped me understand the content	This delivery method was an effective way for me to learn the material	The graphics and illustrations used were meaningful and within context
	1	2.952	1.000	.01	.00	.00				
1	2	.039	8.741	.97	.05	.11				
	3	.010	17.518	.03	.95	.89				
	1	4.922	1.000	.00	.00	.00	.00	.00		
	2	.040	11.138	.47	.07	.13	.00	.01		
2	3	.022	14.797	.52	.03	.06	.11	.17		
	4	.010	22.493	.01	.82	.77	.02	.03		
	5	.006	28.183	.00	.08	.03	.87	.79		
	1	6.890	1.000	.00	.00	.00	.00	.00	.00	.00
	2	.041	12.943	.28	.09	.16	.00	.01	.00	.01
	3	.028	15.723	.63	.03	.03	.01	.03	.16	.02
3	4	.017	20.203	.06	.00	.00	.09	.09	.76	.02
	5	.010	26.328	.00	.64	.69	.06	.00	.03	.12
	6	.008	28.850	.02	.18	.10	.15	.10	.05	.80
	7	.006	33.559	.00	.06	.02	.68	.78	.00	.03

[a]Dependent Variable: I have learned new knowledge skills from this training.

The data samples were also examined for extreme cases that have a standardized residual less than -2 or greater than 2 using the summary table of the residual statistics. When analyzing the 20 samples, I expected 95% of the cases to have standard deviation residuals within about + or – 2. For the STM ILT sample (Table 13), the sample size is 878 and the casewise diagnostics output provided that there were 46 cases (5.2%) that were outside of the limits; therefore, the sample was within 1% of what was expected. I also expected 99% of cases to lie within + or – 2.5; however, 20 cases (2.3%) lie outside of these limits. Therefore, the sample falls just outside of what was expected for an accurate model. The cases in Table 13 that have standardized residuals greater than 3 were large enough to warrant further investigation.

Table 13

Casewise Diagnostics (STM ILT)

Casewise diagnostics[a]				
Case number	Std. residual	I learned new knowledge and skills.	Predicted value	Residual
16	-4.586	1	4.54	-3.541
18	-2.907	4	6.24	-2.245
26	-2.264	4	5.75	-1.748
47	-2.244	2	3.73	-1.733
68	-5.951	2	6.60	-4.595
81	-2.164	5	6.67	-1.671
108	-2.643	3	5.04	-2.041
153	-3.929	2	5.03	-3.034
165	2.374	5	3.17	1.833
186	2.788	5	2.85	2.153
204	2.492	7	5.08	1.924
216	-2.323	5	6.79	-1.793
222	-2.005	4	5.55	-1.548
285	-2.097	5	6.62	-1.619
297	-2.239	4	5.73	-1.729
306	-3.034	3	5.34	-2.343
338	-3.439	1	3.66	-2.655
366	-2.014	4	5.55	-1.555
378	2.150	7	5.34	1.660
423	-3.424	2	4.64	-2.644
449	-2.385	1	2.84	-1.842
450	-2.767	4	6.14	-2.136
461	-3.361	4	6.60	-2.595
481	2.021	5	3.44	1.560
490	-2.061	2	3.59	-1.592
500	-2.695	3	5.08	-2.081
502	2.484	7	5.08	1.918
505	-2.371	2	3.83	-1.830
515	-2.931	2	4.26	-2.263
599	2.037	6	4.43	1.573
602	2.079	7	5.39	1.606
613	-2.273	4	5.75	-1.755
629	-2.323	5	6.79	-1.793
692	-2.009	3	4.55	-1.551
706	-2.394	4	5.85	-1.848
709	-3.207	2	4.48	-2.477
712	-2.323	5	6.79	-1.793
726	2.216	5	3.29	1.711
741	2.263	7	5.25	1.747
763	2.616	6	3.98	2.020
823	2.821	7	4.82	2.178
865	-2.430	2	3.88	-1.876
868	-3.025	2	4.34	-2.336
883	2.800	6	3.84	2.162
892	-3.880	2	5.00	-2.996
896	-4.913	3	6.79	-3.793

[a]Dependent Variable: I learned new knowledge and skills.

SPSS residuals statistics (Table 14) and Case Summaries (Table 15) provide that none of the cases had a Cook's distance greater than 1 (the worst case was .097); therefore, none of the cases had an undue influence on the model. The average leverage for the STM ILT sample is .008. Most cases fall within two times the average (.016); however, cases 16, 338, and 423 fell outside the boundary of three times the average (.024). The Mahalanobis distance values of greater than 25 also supported the conclusion that these three cases may be problematic and further investigation was warranted.

Table 14

Residuals Statistics (STM ILT)

Residuals statistics[a]					
	Minimum	Maximum	Mean	Std. deviation	*N*
Predicted Value	1.23	6.79	5.82	.972	878
Std. Predicted Value	-4.727	.998	.000	1.000	878
Standard Error of Predicted Value	.037	.285	.066	.034	878
Adjusted Predicted Value	1.25	6.80	5.82	.972	878
Residual	-4.595	2.178	.000	.769	878
Std. Residual	-5.951	2.821	.000	.996	878
Stud. Residual	-5.962	2.878	.000	1.003	878
Deleted Residual	-4.612	2.294	.000	.781	878
Stud. Deleted Residual	-6.084	2.890	.000	1.007	878
Mahal. Distance	1.002	118.532	6.992	10.278	878
Cook's Distance	.000	.097	.002	.007	878
Centered Leverage Value	.001	.135	.008	.012	878

[a]Dependent Variable: I learned new knowledge and skills.

Table 15

Case Summaries (STM ILT)

Case Number	Cook's distance	Mahalanobis distance	Centered leverage value
16	0.09711	29.20236	0.03330
68	0.01597	2.14142	0.00244
153	0.00650	1.93520	0.00221
306	0.01164	7.69353	0.00877
338	0.09462	48.93478	0.05580
423	0.05038	27.24360	0.03106
461	0.00509	2.14142	0.00244
709	0.02810	17.37234	0.01981
868	0.03003	20.89600	0.02383
892	0.03915	16.52634	0.01884
896	0.00705	1.03962	0.00119

For each of the three outlier cases, I analyzed the survey scores for the outcome and significant predictors (*learning achieved*, *career benefit*, *worthwhile investment*, *exercises value*, and *instructor knowledge*) and the response to the variables "what percent of your total work time requires the knowledge or skills presented in this training?" and "the participant materials (manual, presentation handouts) will be useful on the job." For case 16 (1, 5, 1, 7, 6) and case 338 (1, 1, 5, 5, 6), the additional variables indicated that the students' work required 0% of the training provided and they strongly disagreed that the material was useful on the job (0, 1). For case 423 (2, 3, 6, 5, 6), the additional variables indicated that the student's work required only 10% of the training provided and the student strongly disagreed that the material was useful on the job (10, 1). It is likely that learning did not occur because the training was not useful in the student's current job, which aligns relatively well with the regression model that has training value as a primary predictor of learning. The cases examined are likely a problem with "having the wrong butts in seats," or students for whom the defense acquisition policies taught do not apply in their workplace. Outliers in other samples reflected the same issues and were not considered a problem with the model. The model appears to be reliable without undue influenced by outlier cases.

To generalize these findings to the defense acquisition workforce, all multiple regression assumptions must be met. These assumptions include: variable types (independent variables are quantitative or categorical and dependent variables are quantitative, continuous, and unbounded); nonzero variance (independent variables); no perfect multicollinearity; homoscedasticity; independent variables are uncorrelated with external variables; independent errors; normally distributed errors; independence (dependent variable values from separate entity); and, linearity (Field, 2009; Green & Salkind, 2011). The diagnostics discussed have shown that there is little to no collinearity within the data and the Durbin-Watson test was used to determine that the residuals in the model are independent.

Histograms, standardized residuals (*ZRESID) against standardized predicted values (*ZPRED) plots, and normal probability plots of the residuals were analyzed to check that all assumptions have been met. Heteroscedasity would cause the dots to funnel in one direction. A lack of linearity would cause the dots to curve. The LOG SPW scatterplot (Figure 1) and all other sample scatterplots show a relatively even dispersion with no funneling or curvature, so the assumptions of linearity and homoscedasticity were likely met.

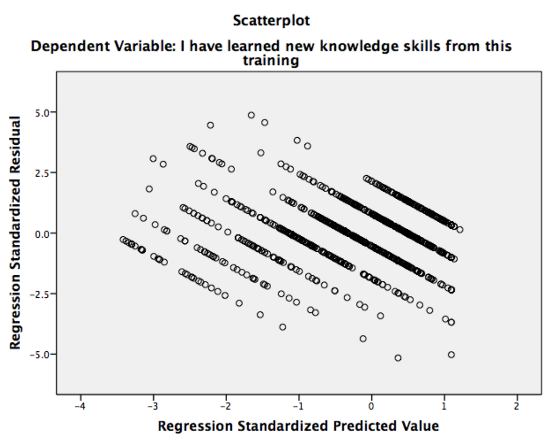

Figure 1. Scatterplot (LOG SPW).

The histogram and normal probability plot were used to test the normality of residuals. The PMT SPW histogram (Figure 2) shows a relatively normal distribution or bell curve that indicates that the normality of residuals assumption has likely been met. These findings are indicative of all samples tested.

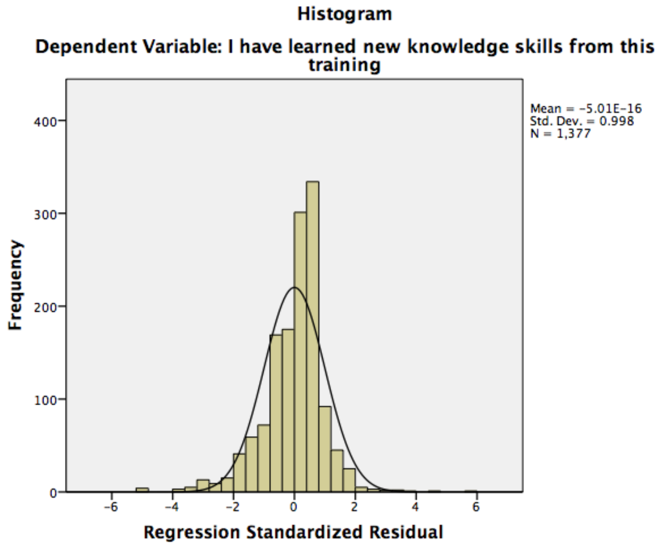

Figure 2. Histogram (PMT SPW).

Deviations from normality can also be seen in the normal probability plot. In the normal probability plot, a normal distribution is represented by a straight line and the observed residuals are represented by points. The normal probability plot for the ENG ILT sample (Figure 3) did not lie exactly on the normal distribution line, but was relatively close. These findings are representative of all samples and indicate that the normality of residuals assumption has likely been met.

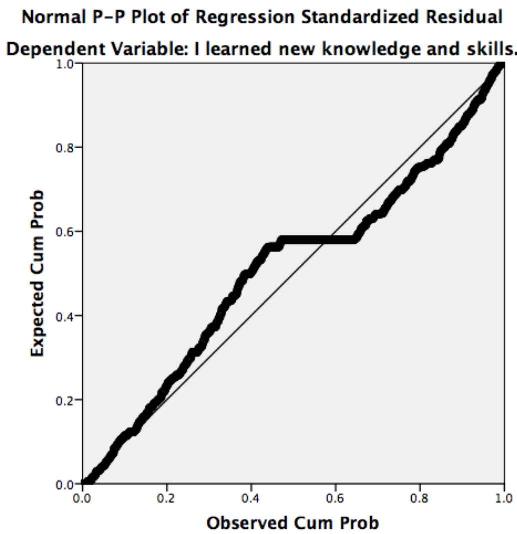

Figure 3. Normal probability plot (ENG ILT).

Partial plots display the outcome variable residuals against each of the predictors. Outliers on the partial plot may indicate cases that may unduly influence the regression coefficient of the predictor (Field, 2009). These plots were also analyzed to confirm homoscedasticity and linear relationships. The STM ILT sample partial plot (Figure 4) shows a positive relationship between *career benefit* and *learning achieved*. The CON SPW sample partial plot (Figure 5) shows a positive relationship between *worthwhile investment* and *learning achieved*. The BCF ILT sample partial plot (Figure 6) shows a positive relationship between *exercises value* and *learning achieved*. The ENG ILT sample partial plot (Figure 7) shows a positive relationship between *examples helped* and *learning achieved*. The CON ILT sample partial plot (Figure 8) shows a positive relationship between *instructor enthusiasm* and *learning achieved*. The CM ILT sample partial plot (Figure 9) shows a positive relationship between *application discussed* and *learning achieved*. The PMT ILT sample partial plot (Figure 10) shows a positive relationship between *instructor knowledge* and *learning achieved*. The LOG SPW sample partial plot (Figure 11) shows a positive relationship between *delivery effective* and *learning achieved*. The BCF SPW sample partial plot (Figure 12) shows a positive relationship between *graphics meaningful* and *learning achieved*. For all samples, there are few obvious outliers on the plots and the dots appear to be relatively evenly spaced around a gradient line, which is an indicator of homoscedasticity.

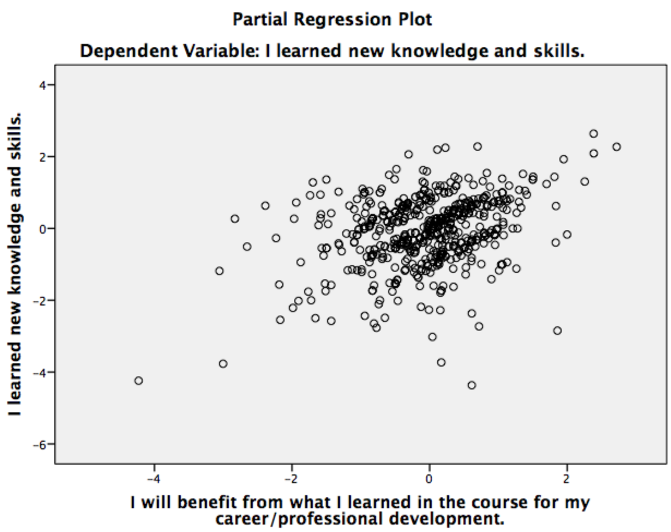

Figure 4. Partial regression plot—Career benefit (STM ILT).

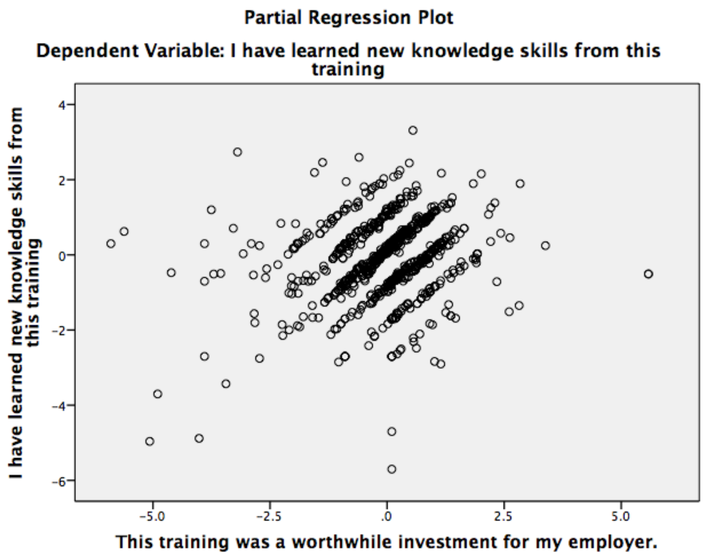

Figure 5. Partial regression plot—Worthwhile investment (CON SPW).

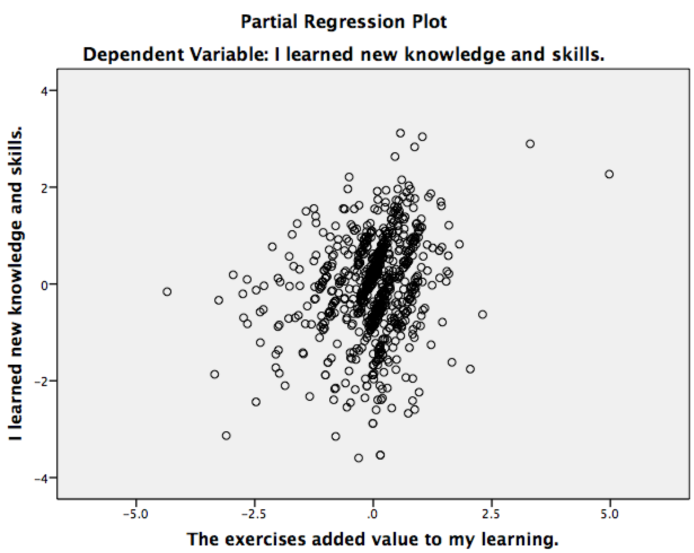

Figure 6. Partial regression plot—Exercises value (BCF ILT).

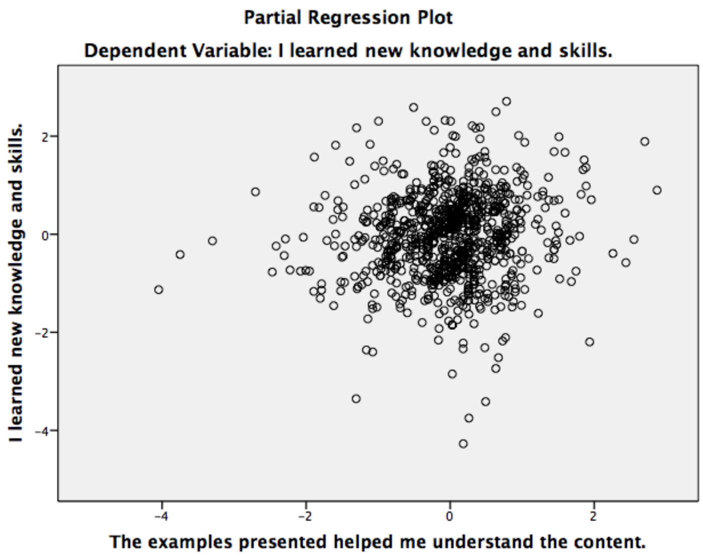

Figure 7. Partial regression plot—Examples helped (ENG ILT).

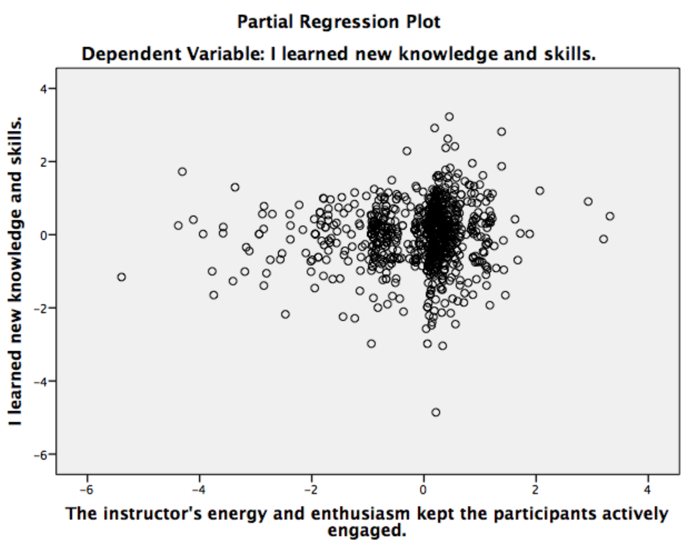

Figure 8. Partial regression plot—Instructor enthusiasm (CON ILT).

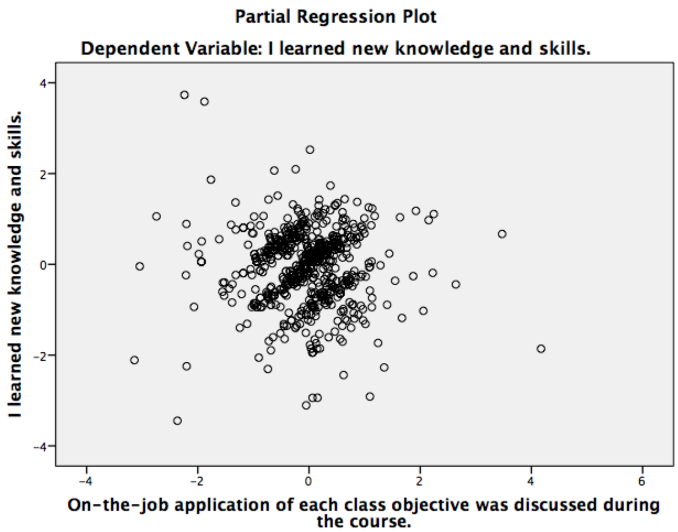

Figure 9. Partial regression plot – Application discussed (CM ILT).

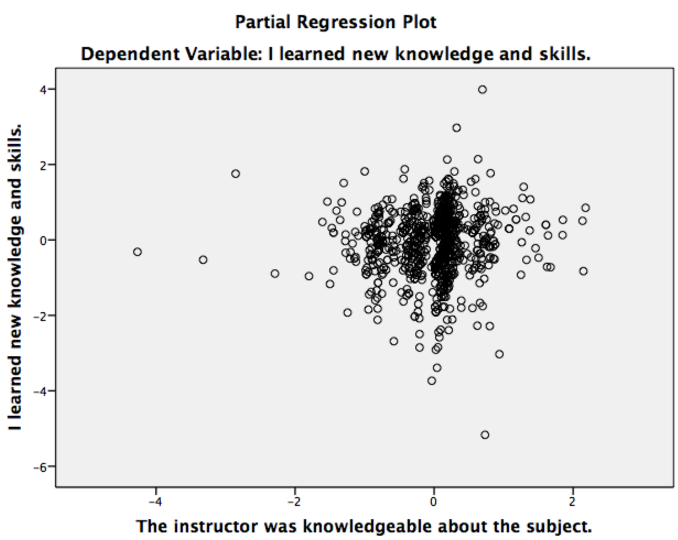

Figure 10. Partial regression plot—Instructor knowledge (PMT ILT).

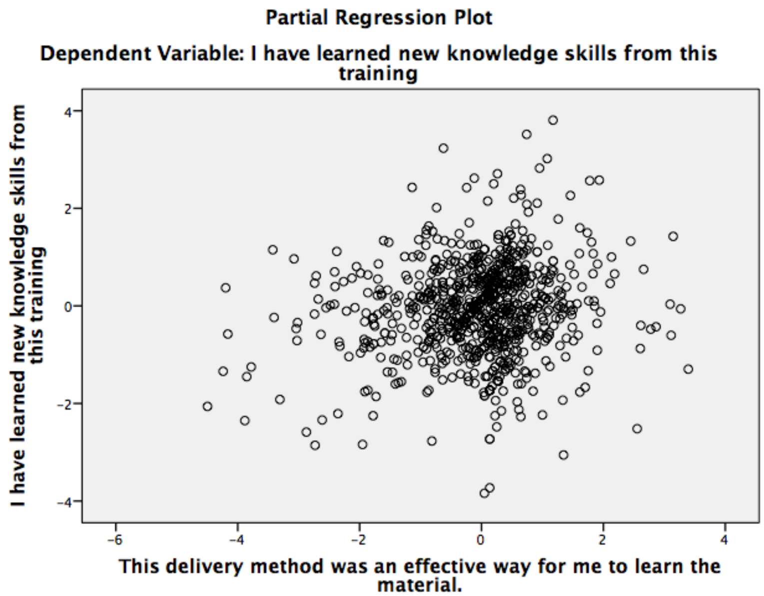

Figure 11. Partial regression plot—Delivery effective (LOG SPW).

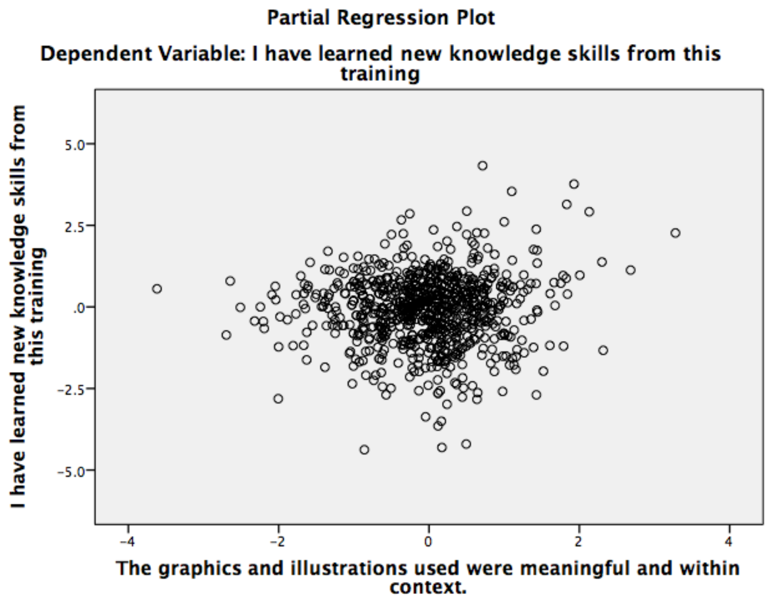

Figure 12. Partial regression plot—Graphics meaningful (BCF SPW).

The key results from the regression analysis of the predictors of *learning achieved* are provided in the regression summary table (Table 16). The findings from my analysis of the data indicated that the model appears to be accurate for the samples tested and generalizable to the defense acquisition workforce. These test results provided justification for the decision to accept or reject the null hypotheses.

Table 16

Regression Summary—Predictors of Learning Achieved

Model		ACQ						BCF					
		ILT (*N*=1826)			SPW (*N*=1532)			ILT (*N*=1474)			SPW (*N*=1366)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	3.394	.083		1.678	.089		2.526	.093		1.456	.106	
	I will benefit from what I learned in the course for my career/professional development.	.377	.024	**.502***	.449	.027	**.477***	.327	.025	**.392***	.516	.033	**.531***
	This training was a worthwhile investment for my employer.	.115	.022	**.169***	.271	.024	**.324***	.284	.023	**.371***	.212	.031	**.233***
		***R*-square = .422**			***R*-square = .588**			***R*-square = .522**			***R*-square = .545**		
2	(Constant)	.812	.150		1.044	.104		.916	.136		.842	.125	
	I will benefit from what I learned in the course for my career/professional development.	.269	.022	**.358***	.318	.029	**.338***	.241	.023	**.289***	.417	.034	**.428***
	This training was a worthwhile investment for my employer.	.055	.020	**.082****	.218	.024	**.260***	.184	.022	**.241***	.152	.031	**.168***
	The exercises added value to my learning.	.380	.035	**.298***	.128	.034	**.125***	.318	.034	**.275***	.200	.040	**.179***
	The examples presented helped me understand the content.	.166	.037	**.120***	.158	.035	**.146***	.105	.035	**.085****		**Not Sig.**	
		***R*-square change = .111**			***R*-square change = .030**			***R*-square change = .072**			***R*-square change = .025**		
3	(Constant)	-.027	.249		.945	.105		.263	.269		.727	.129	
	I will benefit from what I learned in the course for my career/professional development.	.253	.024	**.336***	.308	.029	**.328***	.231	.026	**.276***	.411	.034	**.423***
	This training was a worthwhile investment for my employer.	.044	.020	**.065*****	.187	.024	**.224***	.176	.022	**.230***	.139	.031	**.153***
	The exercises added value to my learning.	.374	.035	**.293***	.079	.035	**.078*****	.312	.034	**.269***	.161	.042	**.144***
	The examples presented helped me understand the content.	.109	.039	**.079****	.107	.036	**.099****		**Not Sig.**			**Not Sig.**	
	The instructor's energy and enthusiasm kept the participants actively engaged.	.100	.042	**.057*****				.089	.033	**.058****			
	On-the-job application of each class objective was discussed during the course.	.047	.020	**.055*****					**Not Sig.**				
	The instructor was knowledgeable about the subject.		**Not Sig.**						**Not Sig.**				
	This delivery method was an effective way for me to learn the material.				.111	.023	**.123***					**Not Sig.**	
	The graphics and illustrations used were meaningful and within context.					**Not Sig.**					.106	.039	**.092****

table continues

	***R*-square change = .007** *(p < .001) **(p < .01) ***(p < .05)	***R*-square change = .010** *(p < .001) **(p < .01) ***(p < .05)	***R*-square change = .004** *(p < .001) **(p < .01) ***(p < .05)	***R*-square change = .004** *(p < .001) **(p < .01) ***(p < .05)

Note. Dependent Variable: I learned new knowledge and skills.
DAU Postevent Surveys

Model		CM						CON					
		ILT (*N*=1668)			SPW (*N*=1462)			ILT (*N*=2000)			SPW (*N*=1588)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	2.059	.107		.734	.130		2.040	.081		.971	.101	
	I will benefit from what I learned in the course for my career/professional development.	.405	.027	**.423***	.517	.034	**.459***	.412	.021	**.460***	.545	.026	**.536***
	This training was a worthwhile investment for my employer.	.284	.024	**.338***	.320	.031	**.304***	.286	.018	**.362***	.264	.024	**.275***
		***R*-square = .520**			***R*-square = .527**			***R*-square = .609***			***R*-square = .593**		
2	(Constant)	1.465	.114		.474	.162		1.455	.096		.660	.109	
	I will benefit from what I learned in the course for my career/professional development.	.307	.027	**.320***	.477	.035	**.424***	.320	.021	**.357***	.436	.030	**.429***
	This training was a worthwhile investment for my employer.	.210	.023	**.249***	.296	.032	**.281***	.232	.018	**.294***	.230	.024	**.240***
	The exercises added value to my learning.	.084	.017	**.116***	.145	.044	**.114****	.180	.023	**.193***	.158	.039	**.149***
	The examples presented helped me understand the content.	.181	.024	**.186***		**Not Sig.**		.055	.026	**.052*****		**Not Sig.**	
		***R*-square change = .046**			***R*-square change = .005**			***R*-square change = .030**			***R*-square change = .014**		
3	(Constant)	1.107	.159		.382	.168		.804	.151		.542	.110	
	I will benefit from what I learned in the course for my career/professional development.	.305	.030	**.318***	.470	.035	**.417***	.249	.023	**.279***	.414	.029	**.407***
	This training was a worthwhile investment for my employer.	.204	.023	**.243***	.288	.033	**.274***	.222	.018	**.281***	.200	.025	**.209***
	The exercises added value to my learning.	.083	.017	**.114***	.139	.044	**.110****	.171	.023	**.183***	.123	.039	**.117****
	The examples presented helped me understand the content.	.164	.026	**.168***		**Not Sig.**		-.003	.026	**-.003**		**Not Sig.**	
	The instructor's energy and enthusiasm kept the participants actively engaged.		**Not Sig.**					.072	.021	**.064****			
	On-the-job application of each class objective was discussed during the course.		**Not Sig**					.112	.019	**.121***			
	The instructor was knowledgeable about the subject.	.084	.035	**.061*****				.059	.029	**.036*****			
	This delivery method was an effective way for me to learn the material.					**Not Sig.**					.128	.025	**.129***

table continues

The graphics and illustrations used were meaningful and within context.		**Not Sig.**		**Not Sig.**
	***R*-square change = .003**	***R*-square change = .001**	***R*-square change = .013**	***R*-square change = .009**
	*($p < .001$)	*($p < .001$)	*($p < .001$)	*($p < .001$)
	**($p < .01$)	**($p < .01$)	**($p < .01$)	**($p < .01$)
	***($p < .05$)	***($p < .05$)	***($p < .05$)	***($p < .05$)

Note. Dependent Variable: I learned new knowledge and skills.
DAU Postevent Surveys

Model		ENG						LOG					
		ILT (N=1484)			SPW (N=1417)			ILT (N=1489)			SPW (N=1558)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	2.052	.085		1.079	.097		2.788	.087		1.162	.074	
	I will benefit from what I learned in the course for my career/professional development.	.462	.027	**.527***	.392	.029	**.389***	.391	.024	**.499***	.529	.027	**.563***
	This training was a worthwhile investment for my employer.	.207	.024	**.266***	.391	.027	**.427***	.186	.022	**.255***	.254	.025	**.296***
		***R*-square = .581**			***R*-square = .607**			***R*-square = .520**			***R*-square = .695**		
2	(Constant)	.779	.106		.728	.114		.600	.137		.624	.091	
	I will benefit from what I learned in the course for my career/professional development.	.316	.025	**.361***	.322	.031	**.320***	.256	.023	**.327***	.402	.028	**.429***
	This training was a worthwhile investment for my employer.	.130	.022	**.168***	.353	.027	**.386***	.138	.020	**.189***	.198	.024	**.231***
	The exercises added value to my learning.	.253	.028	**.252***	.102	.038	**.095****	.228	.034	**.194***	.256	.035	**.243***
	The examples presented helped me understand the content.	.163	.031	**.146***	.063	.038	**.055**	.279	.036	**.215***		**Not Sig.**	
		***R*-square change = .081**			***R*-square change = .010**			***R*-square change = .099**			***R*-square change = .027**		
3	(Constant)	.075	.187		.636	.117		.107	.262		.443	.093	
	I will benefit from what I learned in the course for my career/professional development.	.279	.026	**.318***	.321	.031	**.318***	.220	.025	**.280***	.387	.027	**.413***
	This training was a worthwhile investment for my employer.	.117	.022	**.151***	.334	.027	**.365***	.130	.020	**.179***	.177	.024	**.205***
	The exercises added value to my learning.	.236	.028	**.235***		**Not Sig.**		.206	.034	**.176***	.180	.036	**.171***
	The examples presented helped me understand the content.	.121	.031	**.108***		**Not Sig.**		.263	.037	**.203***		**Not Sig.**	
	The instructor's energy and enthusiasm kept the participants actively engaged.		**Not Sig.**						**Not Sig.**				
	On-the-job application of each class objective was discussed during the course.	.097	.023	**.093***				.081	.021	**.092***			
	The instructor was knowledgeable about the subject.		**Not Sig.**					.152	.061	**.064*****			

table continues

This delivery method was an effective way for me to learn the material.				.124	.027	**.123***				.148	.024	**.143***
The graphics and illustrations used were meaningful and within context.					**Not Sig.**						**Not Sig.**	
	R-square change = .008			**R-square change = .007**			**R-square change = .006**			**R-square change = .010**		
	*(*p* < .001)			*(*p* < .001)			*(*p* < .001)			*(*p* < .001)		
	**(*p* < .01)			**(*p* < .01)			**(*p* < .01)			**(*p* < .01)		
	***(*p* < .05)			***(*p* < .05)			***(*p* < .05)			***(*p* < .05)		

Note. Dependent Variable: I learned new knowledge and skills.
DAU Postevent Surveys

Model		PMT						PQM					
		ILT (*N*=1847)			SPW (*N*=1377)			ILT (*N*=1832)			SPW (*N*=1401)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	2.058	.098		1.127	.112		2.769	.092		1.148	.109	
	I will benefit from what I learned in the course for my career/professional development.	.456	.024	**.489***	.440	.033	**.429***	.379	.024	**.451***	.536	.031	**.526***
	This training was a worthwhile investment for my employer.	.226	.022	**.273***	.316	.031	**.335***	.201	.022	**.259***	.229	.028	**.247***
		***R*-square = .523**			***R*-square = .532**			***R*-square = .453**			***R*-square = .549**		
2	(Constant)	1.177	.118		.838	.129		.267	.164		.582	.132	
	I will benefit from what I learned in the course for my career/professional development.	.365	.024	**.391***	.390	.034	**.381***	.253	.023	**.301***	.439	.033	**.431***
	This training was a worthwhile investment for my employer.	.150	.021	**.180***	.263	.032	**.278***	.155	.020	**.200***	.168	.029	**.182***
	The exercises added value to my learning.	.186	.027	**.183***	.158	.037	**.153***	.213	.033	**.158***	.188	.051	**.161***
	The examples presented helped me understand the content.	.116	.030	**.103***		**Not Sig.**		.324	.035	**.217***		**Not Sig.**	
		***R*-square change = .042**			***R*-square change = .012**			***R*-square change = .081**			***R*-square change = .019**		
3	(Constant)	.509	.163		.907	.133		-.660	.238		.483	.136	
	I will benefit from what I learned in the course for my career/professional development.	.325	.026	**.348***	.393	.034	**.384***	.222	.025	**.264***	.428	.033	**.420***
	This training was a worthwhile investment for my employer.	.138	.021	**.167***	.238	.032	**.252***	.150	.020	**.193***	.158	.029	**.171***
	The exercises added value to my learning.	.173	.026	**.170***	.158	.038	**.153***	.182	.033	**.135***	.154	.052	**.132****
	The examples presented helped me understand the content.		**Not Sig.**			**Not Sig.**		.256	.037	**.171***		**Not Sig.**	
	The instructor's energy and enthusiasm kept the participants actively engaged.		**Not Sig.**						**Not Sig.**				
	On-the-job application of each class objective was discussed during the course.	.063	.023	**.066****				.057	.022	**.063*****			

table continues

Model		B	Std. Error	Beta	B	Std. Error	Beta	B	Std. Error	Beta	B	Std. Error	Beta
	The instructor was knowledgeable about the subject.	.108	.035	**.071****				.129	.054	**.061*****			
	This delivery method was an effective way for me to learn the material.				.141	.027	**.149***				.084	.033	**.076*****
	The graphics and illustrations used were meaningful and within context.				-.118	.037	**-.104****				**Not Sig.**		
		***R*-square change = .010** *(*p* < .001) **(*p* < .01) ***(*p* < .05)			***R*-square change = .009** *(*p* < .001) **(*p* < .01) ***(*p* < .05)			***R*-square change = .009** *(*p* < .001) **(*p* < .01) ***(*p* < .05)			***R*-square change = .003** *(*p* < .001) **(*p* < .01) ***(*p* < .05)		

Note. Dependent Variable: I learned new knowledge and skills.
DAU Postevent Surveys

Model		STM						TST					
		ILT (*N*=878)			SPW (*N*=0)			ILT (*N*=1213)			SPW (*N*=1371)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	1.595	.125					1.701	.103		1.062	.116	
	I will benefit from what I learned in the course for my career/professional development.	.486	.034	**.505***				.539	.027	**.576***	.445	.032	**.418***
	This training was a worthwhile investment for my employer.	.247	.030	**.300***				.188	.023	**.240***	.349	.029	**.366***
		***R*-square = .585**			***R*-square =**			***R*-square = .608**			***R*-square = .553**		
2	(Constant)	.781	.173					.465	.145		.529	.136	
	I will benefit from what I learned in the course for my career/professional development.	.398	.036	**.413***				.425	.028	**.455***	.364	.033	**.342***
	This training was a worthwhile investment for my employer.	.209	.029	**.254***				.125	.022	**.160***	.290	.029	**.304***
	The exercises added value to my learning.	.171	.038	**.153***				.245	.034	**.210***	.139	.031	**.132***
	The examples presented helped me understand the content.	**Not Sig.**						.111	.037	**.087****	.088	.036	**.072*****
		***R*-square change = .024**			***R*-square change =**			***R*-square change = .044**			***R*-square change = .020**		
3	(Constant)	.117	.263					.141	.251		.462	.138	
	I will benefit from what I learned in the course for my career/professional development.	.375	.038	**.389***				.392	.030	**.420***	.356	.033	**.335***
	This training was a worthwhile investment for my employer.	.198	.029	**.240***				.119	.022	**.152***	.245	.030	**.257***
	The exercises added value to my learning.	.157	.039	**.141***				.232	.034	**.200***	.115	.031	**.109***
	The examples presented helped me understand the content.	**Not Sig.**						.087	.038	**.068*****	**Not Sig.**		
	The instructor's energy and enthusiasm kept the participants actively engaged.	**Not Sig.**						**Not Sig.**					

table continues

On-the-job application of each class objective was discussed during the course.	**Not Sig.**		.073 .028 **.068****	
The instructor was knowledgeable about the subject.	.122 .054 **.067*****		**Not Sig.**	
This delivery method was an effective way for me to learn the material.				.124 .028 **.126***
The graphics and illustrations used were meaningful and within context.				**Not Sig.**
	***R*-square change = .006** *($p < .001$) **($p < .01$) ***($p < .05$)	***R*-square change =** *($p < .001$) **($p < .01$) ***($p < .05$)	***R*-square change = .003** *($p < .001$) **($p < .01$) ***($p < .05$)	***R*-square change = .008** *($p < .001$) **($p < .01$) ***($p < .05$)

Note. Dependent Variable: I learned new knowledge and skills.
DAU Postevent Surveys

Findings (Part 1): Predictors of Learning Achieved

Hypothesis 1. The research hypothesis was accepted and provided that there is a highly significant positive correlation between *career benefit* and *learning achieved* and that *learning achieved* can be predicted from *career benefit* for all DAU courses.

Hypothesis 2. The research hypothesis was accepted and provided that there is a significant positive correlation between *worthwhile investment* and *learning achieved* and that *learning achieved* can be predicted from *worthwhile investment* for all DAU courses.

Hypothesis 3. The research hypothesis was accepted for all DAU courses, except ENG (SPW), and provided that there is a significant positive correlation between *exercises value* and *learning achieved* and that *learning achieved* can be predicted from *exercises value*. The research hypothesis was rejected for ENG (SPW) courses, which means that there is not a significant correlation, or relationship, between the predictor, *exercises value,* and the outcome, *learning achieved*.

Hypothesis 4. The research hypothesis was rejected for BCF (ILT and SPW), CM (SPW), CON (SPW), ENG (SPW), LOG (SPW), PMT (ILT and SPW), PQM (SPW), STM (ILT), and TST (SPW). This means that there is not a significant correlation, or relationship, between the predictor, *examples helped*, and the outcome, *learning achieved* for these DAU courses. The research hypothesis was accepted for ACQ (ILT and SPW) and CM, CON, ENG, LOG, PQM, and TST ILT courses, which means that there is a significant positive correlation between *examples helped* and *learning achieved* and that *learning achieved* can be predicted from *examples helped*.

Hypothesis 5 (ILT only). The research hypothesis was rejected for CM, ENG, LOG, PMT, PQM, STM, and TST courses. These findings mean that there is not a significant correlation, or relationship, between the predictor, *instructor enthusiasm*, and the outcome, *learning achieved* for these DAU courses. The research hypothesis was accepted for ACQ, BCF, and CON and provided that there is a significant positive correlation between *instructor enthusiasm* and *learning achieved* and that *learning achieved* can be predicted from *instructor enthusiasm* for these courses.

Hypothesis 6 (ILT only). The research hypothesis was rejected for BCF, CM, and STM, which means that there is not a significant correlation, or relationship, between the predictor, *application discussed*, and the outcome, *learning achieved* for these DAU courses. The research hypothesis was accepted for ACQ, CON, ENG, LOG, PMT, PQM, and TST. These findings provided that for these courses there is a significant positive correlation between *application discussed* and *learning achieved* and that *learning achieved* can be predicted from *application discussed*.

Hypothesis 7 (ILT only). The research hypothesis was rejected for ACQ, BCF, ENG, and TST. These findings mean that there is not a significant correlation, or relationship, between the predictor, *instructor knowledge*, and the outcome, *learning achieved* for these DAU courses. The research hypothesis was accepted for CM, CON, LOG, PMT, PQM, and STM. These findings provided that there is a significant positive correlation between *instructor knowledge* and *learning achieved* and that *learning achieved* can be predicted from *instructor knowledge* for these DAU courses.

Hypothesis 8 (SPW only). The research hypothesis was rejected for BCF and CM, which means that there is not a significant correlation, or relationship, between the predictor, *delivery effective*, and the outcome, *learning achieved*. The research hypothesis was accepted for ACQ, CON, ENG, LOG, PMT, PQM, and TST. These findings provided that there is a significant positive correlation between *delivery effective* and *learning achieved* and that *learning achieved* can be predicted from *delivery effective* for these courses.

Hypothesis 9 (SPW only). The research hypothesis was rejected for ACQ, CM, CON, ENG, LOG, PQM, and TST. These findings mean that there is not a significant correlation, or relationship, between the predictor, *graphics meaningful,* and the outcome, *learning achieved* for these DAU courses. The research hypothesis was accepted for BCF and PMT and provided that there is a significant positive correlation between *graphics meaningful* and *learning achieved* and that *learning achieved* can be predicted from *graphics meaningful.*

Analysis (Part 2) – Predictors of Applied Training

Descriptive statistics (Tables 17 and 18) characterize the 20 samples used for the analysis of Stage 3 of the four-stage culture change model to determine important predictors of the *applied training* outcome for both the ILT and SPW DAU courses. The descriptive statistics include mean, standard deviation, and sample size. The means of the Likert score (7 = strongly agree and 1 = strongly disagree) and percentage score responses to the variables indicate how the students in each sample perceive the variable in question. The *applied training* outcome means for resident ILT courses range from a low of 5.23 for ENG to a high of 6.11 for CM. For online SPW courses, the means for *learning achieved* range from a low of 4.98 for LOG to a high of 5.81 for CM. A review of the means shows that resident ILT courses appear to be more effective in driving workplace application of behavior learned from training compared to online SPW courses.

The means of *learning achieved* from the follow-up survey responses align relatively well with the means of *learning achieved* from the postevent surveys. The follow-up survey means for resident ILT courses ranged from a low of 5.74 for ENG and STM to a high of 6.34 for PMT. For online SPW courses, the means for *learning achieved* from follow-up surveys ranged from a low of 5.53 for LOG to a high of 6.00 for CM. The results showed higher *learning achieved* scores for resident ILT courses than for the online SPW courses for all functional areas.

For the resident ILT courses (Table 17), the *learning achieved* variable has the highest mean scores and regression analysis results indicate that the *learning achieved* variable is the most important predictor of application of behavior learned in training. The *manager involvement* variable has the lowest mean scores, but *manager involvement* is the least important of the tested predictors of *applied training*. Table 4 provides that the online SPW courses showed similar results with the most important predictor of *applied training* having received the highest Likert scores.

Table 17

Descriptive Statistics (ILT)

Follow-Up Survey Data Instructor Led Training	ACQ(*N*=1317)		BCF(*N*=646)		CM(*N*=416)		CON(*N*=1624)		ENG(*N*=726)	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
I have been able to successfully apply the knowledge/skills learned in this class to my job.	5.82	1.239	5.40	1.556	6.11	1.175	5.83	1.395	5.23	1.471
I learned new knowledge and skills from this training.	6.13	1.122	6.09	1.081	6.32	.983	6.29	1.022	5.74	1.241
What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	43.25	26.496	37.43	27.673	60.77	28.094	47.25	29.834	38.61	26.426
I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	5.69	1.453	5.54	1.651	5.93	1.344	5.60	1.629	5.48	1.511
After training, my manager and I discussed how I will use the learning on my job.	4.48	2.039	4.34	2.123	5.17	1.791	4.59	2.086	3.89	2.103

Follow-Up Survey Data Instructor Led Training	LOG(*N*=1196)		PMT(*N*=339)		PMQ(*N*=476)		STM(*N*=182)		TST(*N*=212)	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
I have been able to successfully apply the knowledge/skills learned in this class to my job.	5.45	1.585	5.91	1.178	5.65	1.364	5.34	1.331	5.44	1.448
I learned new knowledge and skills from this training.	6.09	1.175	6.34	.923	6.12	1.054	5.74	1.173	5.94	1.096
What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	39.99	27.651	53.48	27.601	44.83	27.632	35.99	25.071	44.15	29.462
I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	5.59	1.628	6.01	1.194	5.57	1.597	5.29	1.536	5.56	1.483
After training, my manager and I discussed how I will use the learning on my job.	4.48	2.101	4.39	2.053	4.54	2.017	3.46	1.985	4.13	2.102

Table 18

Descriptive Statistics (SPW)

Follow-Up Survey Data Self-Paced Web Training	ACQ(*N*=1783)		BCF(*N*=919)		CM(*N*=297)		CON(*N*=1894)		ENG(*N*=2148)	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
I have been able to successfully apply the knowledge/skills learned in this class to my job.	5.22	1.531	5.22	1.563	5.81	1.173	5.63	1.338	5.17	1.462
I learned new knowledge and skills from this training.	5.79	1.254	5.74	1.299	6.00	1.064	5.92	1.183	5.62	1.293
What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	37.78	26.671	36.77	26.414	49.23	27.009	46.30	28.019	36.53	25.812
I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	5.31	1.684	5.41	1.587	5.99	1.162	5.57	1.492	5.43	1.503
After training, my manager and I discussed how I will use the learning on my job.	4.14	1.991	4.14	2.066	5.24	1.714	4.63	1.957	4.22	1.955

Follow-Up Survey Data Self-Paced Web Training	LOG(*N*=2033)		PMT(*N*=548)		PMQ(*N*=746)		STM(*N*=0)		TST(*N*=257)	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
I have been able to successfully apply the knowledge/skills learned in this class to my job.	4.98	1.688	5.48	1.347	5.36	1.388			5.30	1.403
I learned new knowledge and skills from this training.	5.53	1.404	5.75	1.231	5.82	1.177			5.79	1.193
What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	34.54	26.100	45.04	26.561	39.08	25.763			41.75	26.598
I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	5.36	1.672	5.68	1.444	5.64	1.424			5.52	1.381
After training, my manager and I discussed how I will use the learning on my job.	4.24	2.036	4.36	2.097	4.45	1.946			4.13	1.964

The correlation matrix (Table 19) showed the value of Pearson's correlation coefficient between every pair of variables. For all samples, the *learning achieved* has a large positive correlation with *applied training*. Also, the one-tailed significance of each correlation is significant, $p < .001$. The correlation matrix for each sample helped to determine the relationships between predictors and the outcome and to check for multicollinearity. No multicollinearity was found in the data, because there were no substantial correlations ($r > .9$) between predictors.

Table 19

Correlation Matrix (ACQ ILT)

		I have been able to successfully apply the knowledge/skills learned in this class to my job.	I learned new knowledge and skills from this training.	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	After training, my manager and I discussed how I will use the learning on my job.
Pearson Correlation	I have been able to successfully apply the knowledge/skills learned in this class to my job.	1.000	.871	.458	.577	.439
	I learned new knowledge and skills from this training.	.871	1.000	.327	.450	.326
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.458	.327	1.000	.320	.299
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.577	.450	.320	1.000	.526
	After training, my manager and I discussed how I will use the learning on my job.	.439	.326	.299	.526	1.000
Sig. (1-tailed)	I have been able to successfully apply the knowledge/skills learned in this class to my job.	.	.000	.000	.000	.000
	I learned new knowledge and skills from this training.	.000	.	.000	.000	.000
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.000	.000	.	.000	.000
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.000	.000	.000	.	.000
	After training, my manager and I discussed how I will use the learning on my job.	.000	.000	.000	.000	.

The findings confirmed that out of the four predictors across all data subsets, the *learning achieved* variable correlates best with the outcome ($p < .001$), so this variable should best predict *applied training*. I chose the hierarchical method, so each set of summary statistics was repeated for each stage in the hierarchy. In the Model Summary, the first model refers to the first stage of the hierarchy when only *learning achieved* is used as a predictor. The subsequent model refers to when all predictors are used. The SPSS model summaries were used to analyze important findings from each model: The values of *R*, *R*-square, the adjusted *R*-square, *R*-square change, and Durbin-Watson values.

The SPSS model summaries (Tables 20 and 21) provide the multiple correlation coefficient (*R*) between the predictors and the outcome and the value of *R*-squared (Field, 2009). A simple regression, model 1 has only the *learning achieved* predictor included and the *R*-squared values for all samples ranged from a high of .759 for acquisition (ACQ) instructor led training (ILT) to as little as .293 for program management (PMT) instructor led training (ILT), which means that for all samples *learning achieved* accounted for between 29% and 76% of the variation in *applied training* depending on class topic and delivery method. In model 2, the other three predictors are added and the *R*-squared value increases to as much as .826 or 83% (ACQ ILT), or as little as .491 or 49% (PMT ILT) of the variance in *applied training*. Therefore, learning accounts for 76% for ACQ ILT, so *task applicability*, *resources provided*, and *manager involvement* account for 7% of outcome variation. For PMT ILT, learning accounts for 29%, so *task applicability*, *resources provided*, and *manager involvement* account for 20% of the variation in *applied training*. PMT ILT is unique in providing 400 level courses, however, even with those courses removed, the results are nearly the same.

Table 20

Model Summary (ACQ ILT)

ACQ ILT FU Model Summary[c]										
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	*F* Change	df1	df2	Sig. *F* Change	
1	.871[a]	.759	.759	.608	.759	4138.725	1	1315	.000	
2	.909[b]	.826	.825	.518	.067	168.245	3	1312	.000	2.051

[a]Predictors: (Constant), I learned new knowledge and skills from this training.
[b]Predictors: (Constant), I learned new knowledge and skills from this training. After training, my manager and I discussed how I will use the learning on my job. What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training? , I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.
[c]Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

Table 21

Model Summary (PMT ILT)

PMT ILT FU Model Summary[c]										
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	*F* Change	df1	df2	Sig. *F* Change	
1	.541[a]	.293	.291	.992	.293	139.516	1	337	.000	
2	.701[b]	.491	.485	.845	.199	43.479	3	334	.000	2.114

[a]Predictors: (Constant), I learned new knowledge and skills from this training.
[b]Predictors: (Constant), I learned new knowledge and skills from this training. What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training? , After training, my manager and I discussed how I will use the learning on my job. I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.
[c]Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

The adjusted *R*-square was analyzed for all subsets and gave some idea of how well the model can be generalized to the defense acquisition workforce population. The adjusted *R*-square value was the same, or close to, the value of *R*-square for all data subsets, which means that if I were testing the population instead of a sample, the model would account for the same outcome variance (Field, 2009; Green & Salkind, 2011). The change statistics reported whether the change in *R*-square is significant, which was tested using an *F*-ratio and the change in *F* was analyzed.

The change statistics described the difference made when new predictors were added to the model (Field, 2009). For the ENG ILT sample (Table 22), model 1 caused *R*-square to change from 0 to .528, and this change in the amount of variance leads to an *F*-ratio of 810.134, which was highly significant ($p < .001$). In model 2, the addition of the new predictors caused *R*-square to increase by .120. The change in variance explained by the predictors leads to an *F*-ratio of 81.756, which was again highly significant ($p < .001$). This was the case for all data subsets.

Table 22

Model Summary (ENG ILT)

ENG ILT FU model summary[c]										
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	*F* Change	df1	df2	Sig. *F* Change	
1	.727[a]	.528	.527	1.011	.528	810.134	1	724	.000	
2	.805[b]	.648	.646	.875	.120	81.756	3	721	.000	1.960

[a]Predictors: (Constant), I learned new knowledge and skills from this training.
[b]Predictors: (Constant), I learned new knowledge and skills from this training. After training, my manager and I discussed how I will use the learning on my job. What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training? , I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.
[c]Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

The Durbin-Watson statistic was used to check that observation residual terms were uncorrelated to ensure the regression assumption of independent errors was met. For the ENG ILT data (Table 22) the value is 1.960. This meets the conservative rule that suggests the value should be close to 2, so the assumption has likely been met. All of the data subsets met this criterion; therefore, the assumption of independent errors is tenable.

The SPSS ANOVA (Table 23) provided the variance analysis to test whether the regression model is better than using the mean to predict the outcome. The sum of squares value showed the prediction improvement that resulted from fitting a regression line to the DAU secondary data instead of using the mean to estimate the application of training outcome. The *F*-ratio and its associated significance value were again important because they indicated the probability of getting that *F*-ratio by chance if there was no relationship between the predictor and outcome (Field, 2009). For ENG ILT, the ANOVA in Table 23 shows that model 1 has 724 degrees of freedom and model 2 has 721. The average sum of squares (MS) and the *F*-ratio were calculated. $F > 1$ provided that the improvement when applying the model was greater than the model inaccuracy. Model 1 had an *F*-ratio of 810.134 ($p < .001$) and the value of *F* for model 2 is 331.623 ($p < .001$), which meant both models were highly significant and that it was very unlikely for either to have happened by chance. This was the case for all samples, so I found that the model improved my ability to predict the *applied training* outcome over using the mean as an estimate of *applied training*.

Table 23

ANOVA (ENG ILT)

ENG ILT FU ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	*F*	Sig.
	Regression	828.119	1	828.119	810.134	.000[b]
1	Residual	740.074	724	1.022		
	Total	1568.193	725			
	Regression	1015.972	4	253.993	331.623	.000[c]
2	Residual	552.221	721	.766		
	Total	1568.193	725			

[a]Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.
[b]Predictors: (Constant), I learned new knowledge and skills from this training.
[c]Predictors: (Constant), I learned new knowledge and skills from this training. After training, my manager and I discussed how I will use the learning on my job. What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training? I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.

The SPSS coefficients table (Table 24) showed the model parameters for the two steps of the hierarchy. The first step included *learning achieved* and so the parameters for the first model are the beta values and the significance of these values for the simple regression. For ACQ SPW, SPSS results provide that *B* (Y intercept constant) is .021 and this can be interpreted as meaning when no learning occurs (when X = 0), the model predicts that nearly zero *applied training* results. The value of the slope of the regression line is .898, which represents the outcome change associated with a unit change in the predictor. If the predictor variable is increased by one on the Likert scale, then the model predicts that *applied training* variable will increase by 0.898. The units of measure were 7 (strongly agree) to 1 (strongly disagree) on the Likert scale, so for an increase in learning of 1 on the Likert scale, the model predicts a 0.898 increase on the Likert scale for *applied training* following ACQ SPW training of acquisition professionals.

These results indicate the model is useful and significantly improves the ability to predict application of defense acquisition policy training in the workplace. To use this model to make predictions for ACQ SPW courses, I would define the model as:

applied training = 0.021 + (0.898 x *learning achieved*)

This allows a prediction about *applied training* to be made by replacing *learning achieved* with a value of interest.

Table 24

Coefficients (ACQ SPW)

ACQ SPW FU coefficients[a]														
Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.021	.116		.180	.857	-.207	.249					
	I learned new knowledge and skills from this training.	.898	.020	.735	45.785	.000	.859	.936	.735	.735	.735	1.000	1.000
2	(Constant)	-.022	.104		-.207	.836	-.226	.183					
	I learned new knowledge and skills from this training.	.657	.020	.538	33.396	.000	.618	.696	.735	.621	.460	.730	1.369
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.014	.001	.242	15.510	.000	.012	.016	.550	.345	.214	.776	1.289
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.051	.016	.056	3.263	.001	.020	.082	.479	.077	.045	.644	1.554
	After training, my manager and I discussed how I will use the learning on my job.	.155	.013	.201	11.786	.000	.129	.180	.532	.269	.162	.651	1.537

[a]Dependent variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

The model 2 parameters in Table 24 included all four predictors. The confidence interval for the *B*-values, collinearity diagnostics, and the part and partial correlations were analyzed for all data subsets. The *B*-values indicated the model contribution of each predictor and described the relationship between *applied training* and each of the predictors. Since the value was positive for all samples, there is a positive relationship between each predictor and the *applied training* outcome. A negative coefficient would have represented a negative relationship between predictor and outcome. So, as *learning achieved* increases, *applied training* increases; as *task applicability* increases, *applied training* increases; as *resources provided* increases, so does *applied training* (not significant for all samples); and, greater *manager involvement* means greater ability to apply training in the workplace (not significant for all samples).

The *B*-values in Table 24 also report to what degree each predictor affects the *applied training* outcome with other predictors' effects held constant. The *learning achieved* value (*B* = .657) indicates that as *learning achieved* increases by one Likert score, *applied training* increases by 0.657; a 10% increase in *task applicability* (*B* = .014) increases *applied training* by 0.14 Likert score; an increase in resources (*B* = .051) value by 1 results in an increase in *applied training* of 0.051; and, the *manager involvement* value (*B* = .155) indicates that as *manager involvement* increases by 1, *applied training* increases by 0.155.

Table 24 also provided the standard error for each of these beta values that indicated sample variability. The standard error and a derived *t*-test statistic were employed to examine whether the *B*-value was significantly different from zero. If the *t*-test was significant ($p < .05$) then the predictor made a significant model contribution.

For the ACQ SPW model (Table 24), the *learning achieved* ($t(1778) = 33.40$, $p < .001$), *task applicability* ($t(1778) = 15.51$, $p < .001$), *resources provided* ($t(1778) = 3.26$, $p < .001$), and *manager involvement* ($t(1778) = 11.79$, $p < .001$) are all significant predictors of *applied training*. From the magnitude of the *t*-test it appears that the *learning achieved* and the *task applicability* had the greatest impact and that *resources provided* had the least impact on the *applied training* outcome. Although all course topic and delivery combination results provided that *learning achieved* was the most important predictor, the other three predictors varied greatly in their importance in predicting application of training in the workplace.

The standardized versions (Beta) of the *B*-values were easier to interpret than the *B*-values because they are independent of the variables' units of measurement. Measured in standard deviation units, the standardized beta values were directly comparable, which provided a clear measure of predictor's importance in the model (Field, 2009). For LOG SPW (Table 25), the standardized beta values for *learning achieved* (Beta = .545) is more than twice that of *task applicability* (Beta = .228) and manger involvement (Beta = .228), which are of much greater importance than *resources provided* (Beta = .030). The Beta values indicate the relative degree of importance of the variables in the model.

In the LOG SPW model (Table 25), most of the predictors have relatively tight confidence intervals that do not cross zero; however, the *resources provided* predictor's lower bound is zero and has a Sig. of .049 ($p < .05$). Confidence intervals that do not cross zero indicate that the model estimates should represent the true population values. The partial and part correlation values are small, which also reflect a weak unique relationship between this predictor and the *applied training* outcome (Field, 2009). The findings indicate that the *resources provided* predictor is statistically significant, but only barely, for the LOG SPW course type.

Table 25

Coefficients (LOG SPW)

LOG SPW FU Coefficients[a]														
Model		Unstandardized coefficients		Standardized coefficients	*t*	Sig.	95.0% Confidence interval for B		Correlations			Collinearity statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-.127	.097		-1.306	.192	-.318	.064					
	I learned new knowledge and skills from this training.	.923	.017	.768	54.117	.000	.890	.957	.768	.768	.768	1.000	1.000
2	(Constant)	-.114	.088		-1.305	.192	-.286	.057					
	I learned new knowledge and skills from this training.	.655	.018	.545	36.296	.000	.619	.690	.768	.628	.434	.635	1.574
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.015	.001	.228	15.832	.000	.013	.017	.596	.332	.189	.691	1.447
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.030	.015	.030	1.972	.049	.000	.060	.520	.044	.024	.622	1.608
	After training, my manager and I discussed how I will use the learning on my job.	.189	.013	.228	14.749	.000	.164	.214	.612	.311	.176	.599	1.671

[a]Dependent variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

For the LOG SPW model (Table 25), the VIF values were below 10 and the tolerance statistics above 0.2, so I concluded that there is no collinearity within the data. An average VIF of roughly 1 suggests that there is not a problem with collinearity in this regression model. Analyses of all samples provided the same conclusion.

The collinearity diagnostics (Table 26) provided eigenvalues of the cross-products matrix, condition indexes, and variance proportions. Once again, the small eigenvalues on the collinearity diagnostics table were checked to ensure the variance proportions for each predictor were spread across different eigenvalues. For the BCF SPW model, each predictor has much of its variance loading on a different eigenvalue, or dimension. Learning has 84% of variance on dimension 5, *task applicability* has 91% on dimension 2, *resources provided* has 98% on dimension 4, and *manager involvement* has 84% on dimension 3. The collinearity diagnostics data from all samples shows no multicollinearity.

Table 26

Collinearity Diagnostics (BCF SPW)

BCF SPW FU collinearity diagnostics[a]								
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	I learned new knowledge and skills from this training.	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	After training, my manager and I discussed how I will use the learning on my job.
1	1	1.975	1.000	.01	.01			
	2	.025	8.948	.99	.99			
2	1	4.577	1.000	.00	.00	.01	.00	.01
	2	.240	4.364	.02	.01	.91	.01	.00
	3	.120	6.180	.05	.02	.04	.00	.84
	4	.040	10.724	.10	.12	.00	.98	.12
	5	.023	14.091	.83	.84	.03	.01	.03

[a]Dependent variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

The data samples were also examined for extreme cases that have a standardized residual less than -2 or greater than 2 using the summary table of the residual statistics. When analyzing the 20 samples, I expected 95% of the cases to have standard deviation residuals within about + or – 2. For the TST SPW sample (Table 27), the sample size is 257 and the casewise diagnostics output provides that there were 14 cases (5.4%) outside of these limits, so the sample is within 1% of what was expected. I also expected 99% of cases to lie within + or – 2.5; however, 6 cases (2.3%) lie outside of these limits. Therefore, the sample falls just outside of what I expected for an accurate model. The cases in Table 27 that have standardized residuals greater than 3 were large enough to warrant further investigation.

Table 27

Casewise Diagnostics (TST SPW)

TST SPW FU casewise diagnostics[a]				
Case Number	Std. Residual	I have been able to successfully apply the knowledge/skills learned in this class to my job.	Predicted Value	Residual
17	-4.533	1	5.13	-4.133
40	-2.063	1	2.88	-1.882
70	-4.465	1	5.07	-4.071
102	2.354	7	4.85	2.147
129	-3.284	3	5.99	-2.995
229	-3.722	1	4.39	-3.393
240	-2.027	3	4.85	-1.848
272	-2.650	3	5.42	-2.417
290	-2.025	3	4.85	-1.847
298	-2.040	2	3.86	-1.860
308	-2.479	3	5.26	-2.261
314	3.688	7	3.64	3.363
425	-2.116	3	4.93	-1.929
461	-2.194	1	3.00	-2.001

[a]Dependent variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

SPSS residuals statistics (Table 28) and Case Summaries (Table 29) provide that none of the cases has a Cook’s distance value of greater than 1 (the worst case was .366);

therefore, none of the cases had an undue influence on the regression model. The average leverage for the TST SPW sample is .016. Most cases fall within two times (.032); however, cases 17, 40, and 461 fell outside the boundary of three times the average (.048). The Mahalanobis distance guidelines provided by Field (2009) showed that values greater than 15 were problematic with a sample of 100 and three predictors. This value provides a conservative cutoff for the TST SPW sample of 257 and four predictors. Cases 17 and 461 values in Table 29 exceeded this cutoff, confirming that further investigation was warranted.

Table 28

Residuals Statistics (TST SPW)

TST SPW FU residuals statistics[a]					
	Minimum	Maximum	Mean	Std. deviation	N
Predicted value	1.74	7.36	5.30	1.072	257
Std. predicted value	-3.324	1.922	.000	1.000	257
Standard error of predicted value	.065	.288	.122	.036	257
Adjusted predicted value	1.72	7.37	5.30	1.071	257
Residual	-4.133	3.363	.000	.905	257
Std. residual	-4.533	3.688	.000	.992	257
Stud. residual	-4.716	3.756	-.001	1.007	257
Deleted residual	-4.473	3.489	-.001	.932	257
Stud. deleted residual	-4.929	3.858	-.003	1.020	257
Mahal. distance	.286	24.544	3.984	3.328	257
Cook's distance	.000	.366	.006	.026	257
Centered leverage value	.001	.096	.016	.013	257

[a]Dependent variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.

Table 29

Case Summaries (TST SPW)

Case number	Cook's distance	Mahalanobis distance	Centered leverage value
17	.36551	18.44590	.07205
40	.05006	12.50670	.04885
70	.08120	4.01532	.01568
102	.00949	1.15949	.00453
129	.05984	5.73539	.02240
229	.08120	6.09866	.02382
240	.01041	2.16633	.00846
272	.03102	4.41883	.01726
290	.01096	2.33574	.00912
298	.02147	5.28892	.02066
308	.03726	6.32661	.02471
314	.10620	8.28824	.03238
425	.01533	3.24371	.01267
461	.07962	17.26498	.06744

For each of the three outlier cases, I analyzed the scores (*applied training*, *learning achieved*, *task applicability*, *resources provided*, *manager involvement*) and the responses to the string variables “applied training within” and “why no applied training.” For case 17 (1, 7, 30, 1, 1) and case 40 (1, 3, 10, 7, 1), the string variable responses provided “I haven’t applied what I learned yet, but plan to in the future” and “no opportunity.” For case 461 (1, 2, 50, 7, 2), the string variable responses provided “I haven’t applied what I learned yet, but plan to in the future” and “other higher priorities.” Surveying these respondents at a later date, after they have had an opportunity to apply the training, should provide data that aligns with the regression model. Outliers in other samples reflected the same issues and were not considered a problem with the model. The model appears to be reliable without undue influence from outlier cases.

All multiple regression assumptions must be met to generalize the findings to the defense acquisition workforce. These assumptions include variable types (independent variables are quantitative or categorical and dependent variables are quantitative, continuous, and unbounded); nonzero variance (independent variables); no perfect multicollinearity; homoscedasticity; independent variables are uncorrelated with external variables; independent errors; normally distributed errors; independence (dependent variable values from separate entity); and, linearity (Field, 2009; Green & Salkind, 2011). The diagnostics discussed have shown that there is no collinearity within the data and the Durbin-Watson statistic was used to determine that the residuals in the model are independent.

Histograms, standardized residuals (*ZRESID) against standardized predicted values (*ZPRED) plots, and normal probability plots of the residuals were analyzed to check that all assumptions have been met. The *ZRESID and *ZPRED graph should appear as random dots evenly dispersed around zero. Heteroscedasity would cause the dots to funnel in one direction. A lack of linearity would cause the dots to curve. The STM ILT scatterplot (Figure 13) and all other sample scatterplots showed a relatively even dispersion with no funneling or curvature, so the assumptions of linearity and homoscedasticity were likely met.

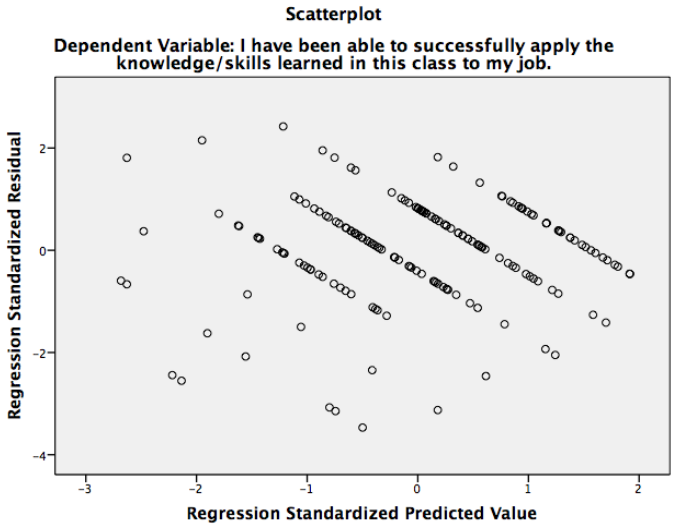

Figure 13. Scatterplot (STM ILT).

The histogram and normal probability plot was used to test the normality of residuals. The PQM IST histogram (Figure 14) showed a relatively normal distribution or bell curve that indicates that the normality of residuals assumption has been met. These findings are indicative of all samples tested.

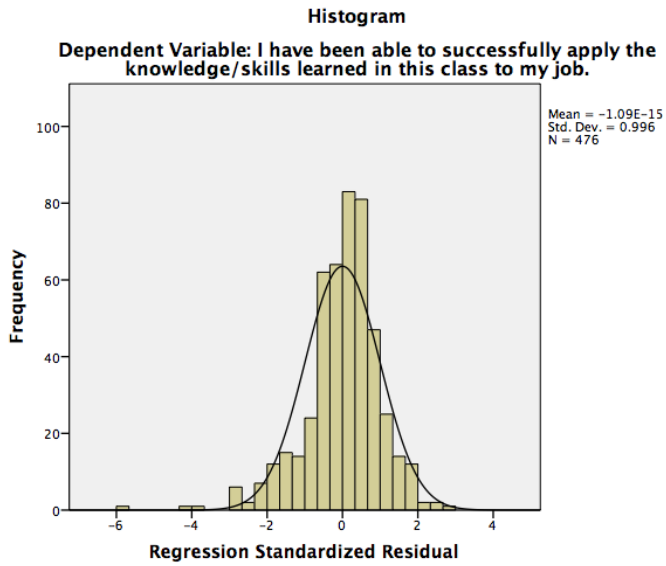

Figure 14. Histogram (PQM ILT).

As described in Part I of this study, deviations from normality can also be seen in the normal probability plot. The normal probability plot for the ENG SPW sample (Figure 15) did not lie exactly on the normal distribution line, but was relatively close. These findings were representative of all samples and indicated that the normality of residuals assumption has likely been met.

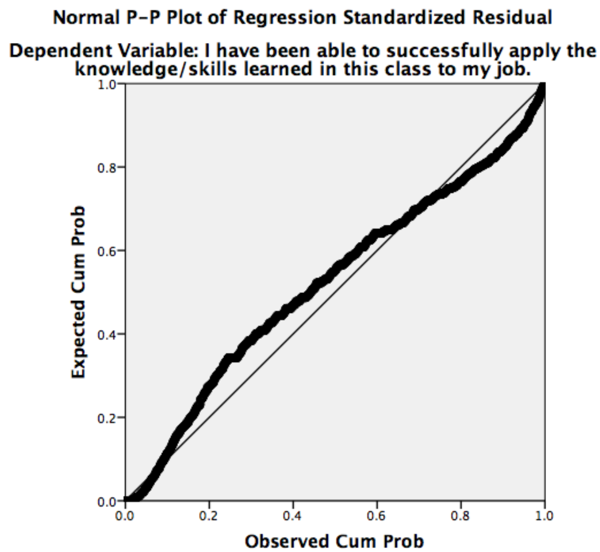

Figure 15. Normal probability plot (ENG SPW).

Partial plots display the outcome variable residuals against each of the predictors. Outliers on partial plot may indicate cases that might unduly influence the regression coefficient of the predictor. These plots were also analyzed to confirm homoscedasticity and linear relationships. The ACQ ILT sample partial plot (Figure 16) showed a strong positive relationship between *learning achieved* and *applied training*. The CON SPW sample partial plot (Figure 17) showed a strong positive relationship between *task applicability* and *applied training*. The BCF ILT sample partial plot (Figure 18) showed a positive relationship between *resources provided* and *applied training*. The PMQ SPW sample partial plot (Figure 19) showed a positive relationship between *manager involvement* and *applied training*. For all samples, there were few obvious outliers on the plots and the dots appear to be relatively evenly spaced around a gradient line, which is an indicator of homoscedasticity.

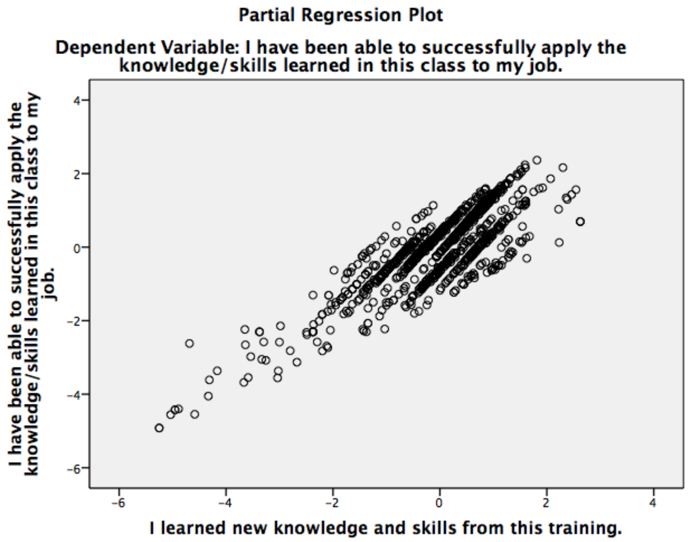

Figure 16. Partial regression plot—Learning achieved (ACQ ILT).

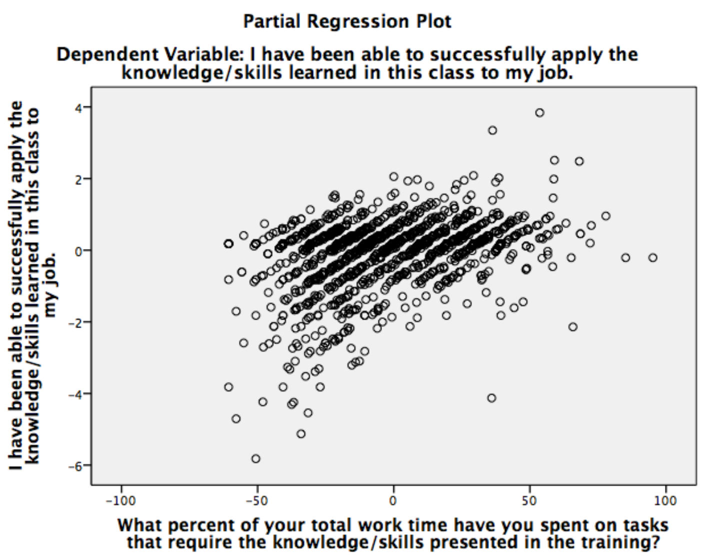

Figure 17. Partial regression plot—Task applicability (CON SPW).

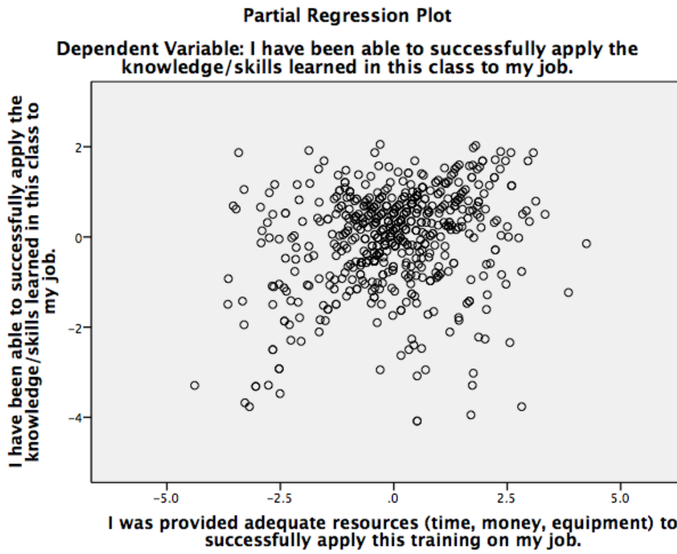

Figure 18. Partial regression plot—Resources provided (BCF ILT).

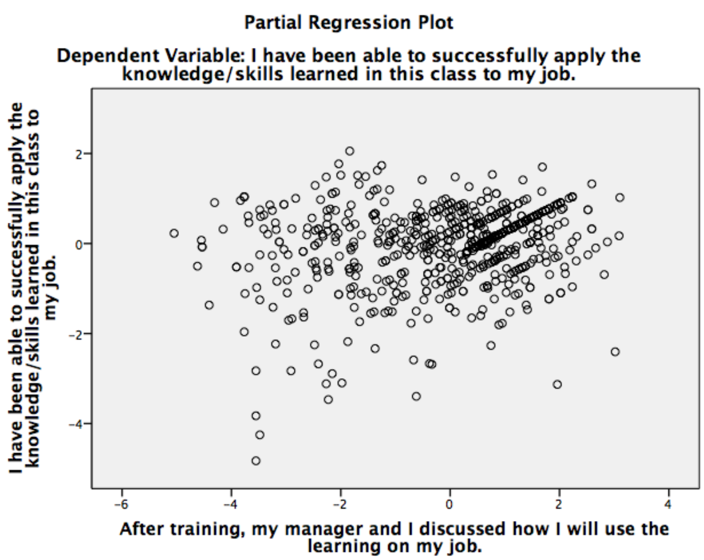

Figure 19. Partial regression plot—Manager involvement (PQM SPW).

The findings of this analysis are summarized in the regression summary table (Table 30) and indicated that the model appears to be accurate for the samples and generalizable to the defense acquisition workforce. For all of the samples, *learning achieved* is the most important predictor of *applied training*, however *task applicability* is also important in predicting the acquisition professional's ability to apply what was learned in acquisition policy training courses on the job. Functional topic and delivery method must be factored in when determining the importance of *resources provided* and *manager involvement* as additional predictors of *applied training*. The multiple regression assumptions appear to have been met, so this model should generalize to the acquisition workforce.

Table 30

Regression Summary—Predictors of Applied Training

Model		ACQ						BCF					
		ILT (*N*=1317)			SPW (*N*=1783)			ILT (*N*=646)			SPW (*N*=919)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
	(Constant)	-.076	.093		.021	.116		.088	.279		.281	.163	
1	I learned new knowledge and skills from this training.	.962	.015	**.871***	.898	.020	**.735***	.872	.045	**.606***	.861	.028	**.716***
		***R*-squared = .759**			***R*-squared = .541**			***R*-squared = .367**			***R*-squared = .513**		
	(Constant)	-.385	.083		-.022	.104		-.247	.240		.099	.153	
	I learned new knowledge and skills from this training.	.801	.015	**.725***	.657	.020	**.538***	.580	.041	**.403***	.640	.028	**.532***
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.007	.001	**.146***	.014	.001	**.242***	.016	.002	**.280***	.015	.001	**.247***
2	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.142	.012	**.167***	.051	.016	**.056****	.207	.031	**.220***	.063	.024	**.064****
	After training, my manager and I discussed how I will use the learning on my job.	.043	.008	**.071***	.155	.013	**.201***	.087	.024	**.119***	.138	.019	**.183***
		***R*-squared Change = .067** *($p < .001$)			***R*-squared Change = .122** *($p < .001$) **($p < .01$)			***R*-squared Change = .202** *($p < .001$)			***R*-squared Change = .121** *($p < .001$) **($p < .01$)		

Note. Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.
DAU Follow-Up Surveys

Model		CM						CON					
		ILT (*N*=416)			SPW (*N*=297)			ILT (*N*=1624)			SPW (*N*=1894)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
	(Constant)	.514	.253		.934	.265		.350	.166		.471	.100	
1	I learned new knowledge and skills from this training.	.884	.040	**.740***	.813	.043	**.737***	.871	.026	**.638***	.871	.017	**.770***
		***R*-squared = .547**			***R*-squared = .543**			***R*-squared = .638**			***R*-squared = .593**		
2	(Constant)	.162	.231		.840	.253		.225	.139		.319	.093	

table continues

	I learned new knowledge and skills from this training.	.672	.040	**.562***	.622	.054	**.564***	.569	.024	**.417***	.678	.018	**.600***
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.009	.001	**.222***	.009	.002	**.208***	.013	.001	**.284***	.010	.001	**.205***
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.130	.035	**.149***			**Not Sig.**	.207	.031	**.213***	.019	.249	**.077***
	After training, my manager and I discussed how I will use the learning on my job.	.069	.025	**.105****	.139	.029	**.203***	.045	.013	**.067****	.089	.011	**.130***
		***R*-squared Change = .103** *(*p* < .001) **(*p* < .01)			***R*-squared Change = .090** *(*p* < .001) **(*p* < .01)			***R*-squared Change = .198** *(*p* < .001) **(*p* < .01)			***R*-squared Change = .078** *(*p* < .001) **(*p* < .01)		

Note. Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.
DAU Follow-Up Surveys

Model		ENG						LOG					
		ILT (*N*=726)			SPW (*N*=2148)			ILT (*N*=1196)			SPW (*N*=2033)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	.289	.178		.316	.091		-.087	.179		-.127	.097	
	I learned new knowledge and skills from this training.	.861	.030	**.727***	.864	.016	**.764***	.909	.029	**.674***	.923	.017	**.768***
		***R*-squared = .528**			***R*-squared = .584**			***R*-squared = .455**			***R*-squared = .590**		
2	(Constant)	.126	.169		.207	.086		-.122	.148		-.114	.088	
	I learned new knowledge and skills from this training.	.634	.030	**.535***	.631	.017	**.558***	.552	.027	**.409***	.655	.018	**.545***
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.015	.001	**.278***	.013	.001	**.223***	.019	.001	**.327***	.015	.001	**.228***
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.104	.025	**.107***	.071	.014	**.073***	.185	.022	**.190***	.030	.015	**.030***

table continues

	After training, my manager and I discussed how I will use the learning on my job.	.077	.018	**.110***	.135	.011	**.181***	.095	.016	**.126***	.189	.013	**.228***
		***R*-squared Change = .120** *(*p* < .001) **(*p* < .01)			***R*-squared Change = .101** *(*p* < .001) **(*p* < .01)			***R*-squared Change = .197** *(*p* < .001) **(*p* < .01)			***R*-squared Change = .119** *(*p* < .001) **(*p* < .01)		

Note. Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.
DAU Follow-Up Surveys

Model		PMT						PQM					
		ILT (*N*=338)			SPW (*N*=548)			ILT (*N*=476)			SPW (*N*=746)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	1.528	.374		.450	.166		.240	.270		.245	.172	
	I learned new knowledge and skills from this training.	.690	.058	**.541***	.875	.028	**.799***	.884	.043	**.683***	.877	.029	**.744***
		***R*-squared = .293**			***R*-squared = .638**			***R*-squared = .467**			***R*-squared = .554**		
2	(Constant)	.681	.341		.102	.163		-.206	.222		.075	.164	
	I learned new knowledge and skills from this training.	.496	.055	**.388***	.714	.029	**.652***	.605	.038	**.468***	.675	.030	**.573***
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.014	.002	**.338***	.010	.001	**.204***	.013	.001	**.269***	.011	.001	**.201***
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.180	.046	**.182***	.075	.025	**.080****	.244	.030	**.285***	.065	.026	**.066*****
	After training, my manager and I discussed how I will use the learning on my job.	.053	.025	**.092*****	.088	.018	**.136***		**NOT SIG.**		.126	.019	**.177***
		***R*-squared Change = .199** *(*p* < .001) ***(*p* < .05)			***R*-squared Change = .077** *(*p* < .001) **(*p* < .01)			***R*-squared Change = .210** *(*p* < .001)			***R*-squared Change = .099** *(*p* < .001) ***(*p* < .05)		

Note. Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.
DAU Follow-Up Surveys

table continues

Model		STM						TST					
		ILT (*N*=182)			SPW (*N*=0)			ILT (*N*=212)			SPW (*N*=257)		
		B	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta	*B*	Std. Error	Beta
1	(Constant)	.680	.347					.247	.413		.734	.324	
	I learned new knowledge and skills from this training.	.811	.059	**.714***				.873	.068	**.661***	.788	.055	**.670***
		***R*-squared = .510**			**No SPW Classes**			***R*-squared = .437**			***R*-squared = .449**		
2	(Constant)	.304	.326					.325	.368		.255	.312	
	I learned new knowledge and skills from this training.	.608	.059	**.536***				.530	.070	**.401***	.604	.055	**.514***
	What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?	.011	.003	**.216***				.014	.002	**.281***	.015	.002	**.288***
	I was provided adequate resources (time, money, equipment) to successfully apply this training on my job.	.166	.047	**.192****				.148	.055	**.152****		**Not Sig.**	
	After training, my manager and I discussed how I will use the learning on my job.		**Not Sig.**					.129	.037	**.187****	.116	.033	**.163****
		***R*-squared Change = .129** *($p < .001$) **($p < .01$)						***R*-squared Change = .166** *($p < .001$) **($p < .01$)			***R*-squared Change = .136** *($p < .001$) **($p < .01$)		

Note. Dependent Variable: I have been able to successfully apply the knowledge/skills learned in this class to my job.
DAU Follow-Up Surveys

Findings (Part 2): Predictors of Applied Training

Hypothesis 10. The research hypothesis is accepted, which means that there is a highly significant positive correlation between *learning achieved* and *applied training* and that *applied training* can be predicted from *learning achieved* for all DAU training courses.

Hypothesis 11. The research hypothesis is accepted, which means that there is a highly significant positive correlation between *task applicability* and *applied training* and that *applied training* can be predicted from *task applicability* for all DAU courses.

Hypothesis 12. The research hypothesis is rejected for CM and TST SPW courses, which means that there is no significant correlation, or relationship, between the predictor, *resources provided*, and the outcome, *applied training*. The research hypothesis is accepted for all other DAU courses, meaning that there is a significant positive correlation between *resources provided* and *applied training* and that *applied training* can be predicted from *resources provided* for these courses.

Hypothesis 13. The research hypothesis is rejected for PQM and STM ILT courses, meaning that there is no significant correlation, or relationship, between the predictor, *manager involvement*, and the outcome, *applied training*. The research hypothesis is accepted for all other DAU courses, which means that there is a significant positive correlation between *manager involvement* and *applied training* and that *applied training* can be predicted from *manager involvement*.

Summary

In Chapter 4, I discussed the study purpose, overarching research question and hypothesis, guiding theory, null and research hypotheses, secondary data description, characteristics of variables, evaluation of regression assumptions, and multiple regression results. The test results provided justification for the decision to accept or reject the hypotheses posed. This quantitative study using ex post facto, cross-sectional and longitudinal survey design found that a relationship exists between *learning achieved* from acquisition policy training and application of learned policy-compliant behavior by the acquisition workforce.

My overarching quantitative research question was: To what extent does the Defense Acquisition University's scenario-based policy training of cross-functional acquisition teams enhance policy-compliant behavior of DoD acquisition workforce personnel? To find the answer to this question, two additional questions were posed. First, what are the important predictors of learning new concepts and behaviors in DAU training? Second, what are the important predictors of application of learned concepts and behaviors from DAU training? These research questions were broken down into 13 testable hypotheses that were evaluated using 40 secondary data samples from DAU surveys to provide unbiased representation of survey participant responses. The regression assumptions were met, which means the findings can be generalized to the defense acquisition workforce population.

What are the important predictors of learning new concepts and behaviors in DAU training? There is a highly significant positive correlation between the predictor, *career benefit*, and a significant correlation between the predictor, *worthwhile investment*, and the outcome, *learning achieved*. This means that how worthwhile the training is to both the acquisition professionals and their organizations drives learning of new concepts in DAU courses. For ILT courses, the *exercises value* variable was a highly significant predictor of *learning achieved*, the second most important behind *career benefit* for half of the functional area courses, and the third most important predictor for the other half. The *exercises value* variable is a measure of the learning value of collaborative, scenario-based, team exercises that provide students with hands on experience applying acquisition policy to real world problems. This predictor was less important for online

SPW courses likely due to no collaborative teaming experience in addressing scenario-based problems presented in training. The *exercises value* was still a significant predictor of learning for all online SPW courses, except ENG.

The *examples helped* variable measures the value of providing real world or scenario-based examples to provide context to the concepts presented in training. This variable is a significant predictor of learning for seven of 10 resident ILT course types and for only one of nine online SPW course types, which is likely due to greater scenario focus and instructor provided examples in resident ILT courses. The *instructor enthusiasm* variable is a measure of the instructors' ability to facilitate student engagement in the training and is a significant predictor of *learning achieve* for only three of 10 ILT courses types.

The *application discussed* variable is a measure of whether on-the-job application of new concepts was discussed in training and was a significant predictor of *learning achieved* for seven of 10 ILT course types. The *instructor knowledge* variable was a measure of the instructor's knowledge of the concepts presented in training and was a significant predictor of *learning achieved* for six of 10 ILT course types. The SPW course *delivery effective* variable was a measure of learning of online delivery of training and was a significant predictor of *learning achieved* for seven of nine SPW course types. The *graphics meaningful* variable was a measure of whether the graphics and illustrations in SPW courses were meaningful and within context with regards to the functional topic being presented. This variable was found to be a significant predictor of *learning achieved* for only two of nine online SPW course types.

What are the important predictors of application of learned concepts and behaviors from DAU training? The *learning achieved* variable measured whether the student learned new knowledge and skills from the DAU training. This variable was found to be a highly significant predictor and the most important predictor of the *applied training* outcome for all DAU courses, accounting for greater than 50% of the variability in the outcome for most courses. Increasing *learning achieved* in DAU policy training increases application of the policy-compliant behavior learned in the defense acquisition workplace.

The *task applicability* variable measured the percentage of total work time spent on tasks that required the knowledge/skills presented in the training. This variable was also a highly significant predictor of the *applied training* outcome for all DAU courses. This finding indicates that to increase application of training on the job, the DoD needs to ensure that the personnel who can use the training on the job are the personnel who are given the training or stated colloquially, to put the right butts in seats.

The *resources provided* variable measured whether adequate resources were provided to successfully apply training on the job. This variable was a significant predictor of *applied training* for all DAU ILT course and seven of nine SPW courses. The *manager involvement* variable measured whether the manager was involved in determining how the concepts learned would be used on the job. This variable was a significant predictor of *applied training* for eight of 10 ILT courses and all SPW courses.

The study findings address the research question: To what extent does the Defense Acquisition University's scenario-based policy training of cross-functional acquisition teams enhance policy-compliant behavior of DoD acquisition workforce personnel? The findings support the conclusion that increasing *learning achieved* in DAU policy training courses is a highly significant predictor of increased application of behavior learned on the job. The findings also support the conclusion that increasing worthwhileness of the training and increasing collaborative, scenario-based problem solving experiences are highly significant predictors of increased *learning achieved* by defense acquisition workforce personnel in DAU policy training courses.

In Chapter 5, I describe in what ways the study findings confirm and extend knowledge in the organizational change implementation discipline as it relates to defense acquisition by comparing these findings with what was found in the peer-reviewed literature. The findings are interpreted in the context of the conceptual and theoretical framework. The possible limitations to generalizability, validity, and reliability of the study findings are also discussed.

Chapter 5: Discussion, Conclusions, and Recommendations

In Chapter 5, I reiterate the purpose and nature of the study, discuss why it was conducted, and summarize key findings. I provide an interpretation of the findings and describe in what ways findings confirm and extend knowledge in the discipline by comparing them with what has been found in the peer-reviewed literature described in Chapter 2. The findings are also analyzed and interpreted in the context of the theoretical framework. I discuss limitations to generalizability, validity, and reliability that arose from execution of the study. Recommendations for further research are provided that are grounded in the strengths and limitations of the current study as well as the literature reviewed in Chapter 2.

The purpose of this quantitative study using ex post facto, cross-sectional and longitudinal survey design was to test the theory that a relationship exists between learning achieved from acquisition policy training and application of learned policy-compliant behavior by the defense acquisition workforce. There is a large body of literature supporting the need for transformative change in the DoD (Cancian, 2010; GAO, 2009c, 2011; Hearing, 2009; Kotzian, 2010; Kratz & Buckingham, 2010; O'Neil, 2011; Tremaine, 2009) and supporting the use of transformational, collaborative leadership techniques in implementing complex change (Allio, 2010; Masciulli, 2011; Messeri & Richards, 2009; Wentling, 2000); however, strategies designed to implement change in the DoD are not well represented in the literature.

The study was conducted to address the quantitative research question: To what extent does the Defense Acquisition University (DAU) scenario-based policy training of cross-functional acquisition teams enhance policy-compliant behavior of the Department of Defense (DoD) acquisition workforce personnel? To find the answer to this question, two additional questions were posed: What are the important predictors of learning new concepts and behaviors in DAU training, and what are the important predictors of application of learned concepts from DAU training? Application of learned concepts from DAU policy training was the policy-compliant behavior change tested in this study.

Interpretation of Findings

This study found DAU training to be a key contributor to implementing defense acquisition policy by driving policy-compliant behavior change in the defense acquisition workforce. The findings from the two-part study are interpreted in the context of the behavior-before-belief model of culture change (Table 2, p. 137), which was derived by combining Schein's (2010) three-stage model of learning/change and his theoretical posit that behavior change comes before changes in the underlying belief system. The first step of the behavior-before-belief model is unfreezing the organization by creating the motivation to change. The literature strongly supports that defense acquisition problems, fiscal crises, and complex, rapid environmental changes are driving the need for culture change in the defense acquisition workforce (Beattie et al., 2013; Burke, 2011; Cancian, 2010; Chiou & Rothenberg, 2003; Clawson, 2012; Edison & Murphy, 2012; Eide & Allen, 2012; Ellis, 2000; GAO, 2009a, 2010a, 2010b, 2010c, 2010f, 2011a, 2011d, 2012b; Gates, 2010; Herb, 2012; Hofbauer et al., 2011; Klijn, 1996; Kratz & Buckingham, 2010; Lee, 2013; Macklem, 2006; Masciulli, 2011; Mikesell, 2011; Pearce & Conger, 2010; Tremaine, 2009). The DoD's motivations for change are well documented in the literature. For DoD leadership and personnel, my literature review has shown that the motivation to change exists, which should unfreeze the status quo and prepare the organization to start the process of developing new cultural assumptions (Schein, 2010). Strategic management efforts used by DoD and other organizations to drive change through policy change planning and implementation were well supported in the literature (Andrews et al., 2011; Boyne & Walker, 2010; Bryson, 2011; Burke, 2011; Harris, 2011; Lempert et al., 2009; Linn, 2008; Poister, 2010; Sharp & Brock, 2011; Wedel, 2005).

The second step in the change model (Table 2) is cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards. All DAU training courses teach complex defense acquisition policies tailored to the functional topic and are updated promptly when policy changes occur. The literature also strongly suggested that transformational, collaborative, active-learning strategies enhance learning and the likelihood of change success (Bass & Riggio, 2010; Bion, 2008; Bontis & Serenko, 2009; Boyne & Walker, 2010; Burke, 2011; Burns, 2010; Cancian, 2010; Carl & Freeman, 2010; Ciulla, 2010; Eide & Allen, 2012; Feiock, Steinacker, & Park, 2009; Hackman, 2010; Herman, 2000; Hofbauer et al., 2011; Hughes, Ginnett, & Curphy, 2010; Karp & Helgø, 2008; Keirsey, 1998; Kotzian, 2010; Maccoby, 2000; Messeri & Richards, 2009; Offermann, 2010; O'Neil, 2011; Plachy, 2009; Rendon, Apte, & Apte, 2012; Schein (2010); Seyranian, 2008; Stevens, Plaut, & Sanchez-Burks, 2010; van Eeden, Cilliers, & van Deventer, 2008). Part 1 of the study tested whether Step 2, cognitive restructuring, occurred by students learning new concepts in DAU policy training courses and determined the predictors of learning.

The organization and culture change literature supports the use of training to facilitate behavioral change (Bontis et al., 2011; Burke, 2011; Burr, 2003; Bryson, 2011; Clawson, 2012; DAU, 2012b, 2013; Defense Business Board's Task Group, 2011; Eide & Allen, 2012; Fishpaw, 2010; Knowles, 1980; Kotzian, 2010; Mikesell, 2011; Ng'ang'a & Otii, 2013; Nissen, 2012; Novitiski, 2008; Patterson, 2006; Redshaw, 2010; Schein, 2010; Simmons, 2006; Tremaine, 2009). In the DoD, defense acquisition policy change is implemented across the acquisition workforce in large part by formal DAU training to enhance policy understanding and facilitate policy-compliant behavior change in the defense acquisition military and civilian workforce. The DAU provides scenario-based policy training courses, which emphasize transformative, collaborative leadership techniques (Assistant Secretary of the Navy, 2011; Fishpaw, 2010). Part 2 of the study tested whether Step 3 of the change model occurred by examining students' on-the-job application of new behaviors learned following DAU policy training courses. The study, Part 2, tested for the predictors of the students' ability to apply new concepts learned in training after the students had returned to the workplace.

Summary of Key Findings

This study found that students learned new concepts in all DAU policy training courses and that the most important predictor of *learning achieved* is *career benefit*, meaning that how beneficial the training is to the acquisition professional's career drives learning of new concepts in all DAU course types. Whether the training was a worthwhile investment for the employer was also a significant predictor of learning. These findings support the Bontis, Hardy, and Mattox (2011) study that found the worthwhile investment construct, which combined benefit to the student's career and employer, to be the most significant predictor of individual learning for DAU courses. This means that important factors in students learning the defense acquisition policy taught in DAU courses are how worthwhile the training is to their career and employer.

The study also found that for resident courses, the *exercises value* variable was a highly significant predictor of *learning achieved*, the second most important behind *career benefit* for ACQ, BCF, ENG, PMT, and TST functional area courses, and the third most important predictor behind *career benefit* and *worthwhile investment* for the other five course types. The *exercises value* variable is a measure of the learning value of collaborative, scenario-based, team exercises that provide students with hands-on experience in applying acquisition policy to real-world problems. This predictor was less important for online SPW courses, likely due to the absence of collaborative teaming experience in addressing scenario-based problems presented in training. The study found that conditional relationships exist between the predictor variables *examples helped*, *instructor enthusiasm, application discussed, instructor knowledge, delivery effective*, and *graphics meaningful* and the outcome, *learning achieved*, dependent on course type.

The results for the important predictors of learning compare well with the previous study using a similar DAU dataset (Bontis et al., 2011). The Bontis study combined the survey responses for the constructs and tested the relationship between the outcome, individual learning, and the predictor constructs worthwhile investment (ß =

0.526), courseware quality (ß = 0.235), and instructor effectiveness (ß = 0.163). The dataset included all online and resident courses in all functional topic areas. For my study, I selected and directly tested the survey response variables with the highest effect in the regression model. For comparison, I selected two variables that represented the constructs tested in the Bontis et al. study, which were worthwhile investment (*career benefit* and *worthwhile investment*), courseware quality (*exercises value* and *examples helped*), and instructor effectiveness (*instructor enthusiasm* and *instructor knowledge*). The findings of my study are similar to those of the Bontis et al. study in terms of the overall constructs. Both studies found the order of importance of predictor constructs to be worthwhile, courseware, and instructor; however, the current study found that conditional relationships existed between many of the tested predictors and the learning outcome.

When a nonspurious relationship was found, I rejected the null hypothesis and elaborated the conditions under which the relationship exists. A causal relationship exists between the predictors *career benefit*, *worthwhile investment*, and *exercises value,* and outcome, *learning achieved*, because the relationship did not disappear for any of the 40 covariate subgroups tested (Frankfort-Nachmias & Nachmias, 2008). Interactions of the other covariates were examined because the size or direction of the association between the predictors and the outcome, *learning achieved*, were greater in one covariate subgroup than another or disappeared altogether, indicating that a conditional relationship exists.

The study does confirm that application of concepts learned from DAU training occurs in the defense acquisition workplace and that the most important predictor of this application of learning was the *learning achieved* variable, which measured whether the student learned new knowledge and skills from the DAU training. This variable was found to be a highly significant predictor and the most important predictor of the *applied training* outcome for all DAU courses, accounting for greater than 50% of the variability in the *applied training* outcome for most courses. Increasing learning achieved in DAU policy training increases application of the policy-compliant behavior learned in the defense acquisition workplace. These findings support acceptance of the research hypothesis that there is a highly significant positive correlation between *learning achieved* and *applied training* and that *applied training* can be predicted from *learning achieved* for all DAU training courses. Application of learned concepts from DAU policy training was the policy-compliant behavior change tested; therefore, this study found that the DAU scenario-based policy training of cross-functional acquisition teams does enhance policy-compliant behavior of the DoD acquisition workforce personnel.

Another highly significant predictor of *applied training* for all DAU courses was the *task applicability* variable, which measured the percentage of total work time spent on tasks that required the knowledge/skills presented in the training. This finding indicates that to increase application of training on the job, the DoD needs to ensure that the personnel who can use the training on the job are the personnel who are given the training. This variable also supports the worthwhile construct and adds further support to the importance of “having the right butts in seats” in DAU courses to increase policy-compliant behavior in the defense acquisition workplace. Conditional relationships exist between *resources provided* and *manager involvement* and the outcome, *applied training*, dependent on the type of course.

Findings (Part 1): Predictors of Learning Achieved

I used multiple regression to better understand the independent variables' relationship with and ability to predict the outcome, or dependent variable, *learning achieved* in DAU courses. The postevent surveys provided the variables for this portion of the study. For the outcome, *learning achieved*, students responded to the statement "I learned new knowledge and skills."

Hypothesis 1. My study found that there is a highly significant positive correlation between *career benefit* and *learning achieved*, which means that *career benefit* is an important driver of learning in all DAU courses. For the predictor *career benefit*, students responded to the statement "I will benefit from what I learned in the course for my career/professional development." Applying this understanding to improve learning could mean using WIIFM (what's in it for me) techniques early in each course to ensure that students understand up front why the course is important to their career/professional development. "Improve the learning outcome" could also mean ensuring "the right butts in seats," or that DAU course assignments should go to personnel for whom the training will be of value to their careers. Future studies could be carried out to determine which acquisition personnel will experience career benefits from different types of DAU training.

Hypothesis 2. My study found that there is a significant positive correlation between *worthwhile investment* and *learning achieved*, which means that *worthwhile investment* is an important driver of learning in all DAU courses. For the predictor *worthwhile investment*, students responded to the statement “This training was a worthwhile investment for my employer.” Applying this understanding to improve learning could mean both ensuring the right butts in seats and helping the students to understand why the course being taken is important to their employer, command, service branch, or the DoD.

Hypothesis 3. My study found that there is a significant positive correlation between *exercises value* and *learning achieved*, which means that *exercises value* is an important driver of learning in all DAU courses except ENG SPW course types. Further investigation into possible causes for the findings for the two online engineering courses indicated that the two online systems engineering courses did not use scenario-based exercises. Scenario-based exercises are being integrated into the next version of the 200-level online engineering course, which should increase the importance of exercises value as a predictor of learning for that course.

For the predictor *exercises value*, students responded to the statement “The exercises added value to my learning.” DAU resident courses provide cross-functional teaming experiences in real-world problem solving within scenario-based exercises, which are found to have the greatest impact on learning after the worthwhile aspect of the course has been established. The Beta values—and therefore importance—of the *exercises value* predictor are lower for the DAU online courses. The DAU online courses, except as noted, also provide scenario-based exercises but do not provide collaborative teaming experiences. Collaborative teaming may be a key factor in why overall learning outcomes score higher for resident courses. Applying this understanding to improve learning could mean further enhancing transformative, collaborative, hands-on training techniques used in DAU courses. This finding is strongly supported by the literature.

Hypothesis 4. My study found that there is a conditional relationship between *examples helped* and *learning achieved*, which means that *examples helped* is an important driver of learning for some DAU courses, including ACQ (ILT and SPW) and CM, CON, ENG, LOG, PQM, and TST ILT course types. For the predictor *examples helped*, students responded to the statement "The examples presented helped me understand the content." Unlike exercises in which students are active participants in learning, examples are provided to the student to help passive learning. For a majority of the courses, the findings indicate that examples provided by instructors in resident courses, which include real-world stories relevant to the topic, were more important to learning than examples provided in online curricula. Applying this understanding to improve learning could mean enhancing examples in online courses to more comprehensively reflect the types of examples used by instructors in resident courses.

Hypothesis 5 (ILT only). My study found that there is a conditional relationship between *instructor enthusiasm* and *learning achieved*, which means that *instructor enthusiasm* is an important driver of learning for a few DAU course types. For the predictor *instructor enthusiasm*, students responded to the statement "The instructor's energy and enthusiasm kept the participants actively engaged." For a majority of the resident courses, the findings indicate that the instructor's energy and enthusiasm, which could be helpful in facilitating discussions, were only important for learning in ACQ, BCF, and CON courses.

Hypothesis 6 (ILT only). My study found that there is a conditional relationship between *application discussed* and *learning achieved*, which means that *application discussed* is an important driver of learning for a majority of DAU course types. For the predictor, *application discussed*, students responded to the statement, "On-the-job application of each class objective was discussed during the course." For all course types, except BCF, CM, and STM, the findings indicate that discussing how course objectives could be applied on-the-job was important to learning. Applying this understanding to improve learning could mean enhancing course curriculum to add additional discussions of how course objectives should be applied in the defense acquisition workplace. Although, this variable was specific to resident courses, course objective application discussions might enhance learning of online curriculum, as well.

Hypothesis 7 (ILT only). My study found that there is a conditional relationship between *instructor knowledge* and *learning achieved*, which means that *instructor knowledge* is an important driver of learning in six of 10 DAU course types. For the predictor, *instructor knowledge*, students responded to the statement, "The instructor was knowledgeable about the subject." For resident courses, except ACQ, BCF, ENG, and TST, the findings indicate that the instructor's subject knowledge was important for learning.

Hypothesis 8 (SPW only). My study found that there is a conditional relationship between *delivery effective* and *learning achieved*, which means that *delivery effective* is an important driver of learning for a majority of DAU online courses. For the predictor, *delivery effective*, students responded to the statement, "The delivery method was an effective way for me to learn the material." For a majority of the courses, the findings indicate that the online *delivery effective* is a predictor of learning for all online courses, except BCF and CM course types. Further investigation to better understand why the online *delivery effective* is not a driver of learning for these course types needs to be done to determine how best to apply these findings.

Hypothesis 9 (SPW only). My study found that there is a conditional relationship between *graphics meaningful* and *learning achieved*, which means that *graphics meaningful* is an important driver of learning for only two of DAU online course types, BCF and PMT. For the predictor, *graphics meaningful*, students responded to the statement, "the graphics and illustrations used were meaningful and within context." For a majority of the courses, the findings indicate that the graphics and illustrations in online curriculum were not drivers of learning. Further investigation needs to be done to better understand why online graphics do not drive learning for most online DAU course types to determine how best to apply these findings.

Findings (Part 2): Predictors of Applied Training

I used multiple regression to better understand the independent variables relationship with and ability to predict the outcome, or dependent variable, *applied training* in DAU courses. The DAU follow-up surveys provided the variables for this portion of the study. For the outcome, *applied training*, students responded to the statement, "I have been able to successfully apply the knowledge/skills learned in this class to my job." The outcome, *applied training*, is critical to determining behavior change, since a behavior change is to do something different than the status quo. In my study, the difference being tested for is the application of new concepts learned in DAU training courses on the job in the defense acquisition workplace.

Hypothesis 10. My study found that there is a highly significant positive correlation between *learning achieved* and *applied training*, which means that *learning achieved* is a very important driver of the student's ability to apply learning from DAU courses on the job. For the predictor, *learning achieved*, students responded to the statement, "I learned new knowledge and skills from this training." Applying this understanding to improve application of learning could be accomplished by increasing learning achieved in DAU training courses (see findings for hypotheses 1 through 9).

Hypothesis 11. My study found that there is a highly significant positive correlation between *task applicability* and *applied training*, which means that *task applicability* is a very important driver of the student's ability to apply learning from DAU courses on the job. For the predictor, *task applicability*, students responded to the question, "What percent of your total work time have you spent on tasks that require the knowledge/skills presented in the training?" Applying this understanding to improve learning could mean both ensuring "the right butts in seats" with regards to assigning students who are currently responsible for tasks that require the knowledge/skills taught and helping the students to understand how to apply the knowledge/skills learned to their work tasks.

Hypothesis 12. My study found that there is a conditional relationship between *resources provided* and *applied training*, which means that *resources provided* is an important driver of the student's ability to apply learning from DAU courses on the job, except for online CM and TST course types. For the predictor, *resources provided*, students responded to the statement, "I was provided adequate resources (time, money, equipment) to successfully apply this training on my job." For a majority of the courses, the findings indicate that having adequate resources were important to being able to apply learning. Applying this understanding to improve application of learning could mean that commands need to ensure adequate resources necessary to apply new knowledge/skills learned in DAU courses are provided. Further investigation may be needed to establish what resources are needed in the workplace to apply learned knowledge/skills.

Hypothesis 13. My study found that there is a conditional relationship between *manager involvement* and *applied training*, which means that *manager involvement* is an important driver of the student's ability to apply learning from DAU courses on the job, except for resident PQM and STM course types. For the predictor, *manager involvement*, students responded to the statement, "After training, my manager and I discussed how I will use the learning on my job." For a majority of the courses, the findings indicate that manager involvement in determining how the learning will be used on the job is important to being able to apply learning. Applying this understanding to improve application of learning could mean that managers should ensure that they take an active role in determining how DAU training is used on the job. Further investigation may be needed to determine how best to help managers of defense acquisition personnel understand their role in enhancing application of learned knowledge/skills in the workplace.

Using Results to Predict Outcomes

The regression summary provided in Table 30 shows the extent to which the Defense Acquisition University's scenario-based policy training of cross-functional acquisition teams enhances policy-compliant behavior of DoD acquisition workforce personnel. To determine the extent of the relationship between the predictors and the outcome, the standardized versions (Beta) of the *B*-values were easier to interpret than the *B*-values because they are independent of the variables' units of measurement. Measured in standard deviation units, the standardized beta values were directly comparable, which provided a clear measure of predictor's importance in the model (Field, 2009). For example, in acquisition courses, *learning achieved* has a greater impact on *applied training* for resident courses (Beta = .725) than for online courses (Beta = .538). Whereas, *manager involvement* has a much greater impact on *applied training* for online ACQ courses (Beta = .201) than for resident ACQ courses (Beta = .071), although it is still not as an important a predictor as *learning achieved*.

For any course type, the *B*-values can be used to make predictions about the outcome, which is expressed in the form of an equation. This allows a prediction about either outcome for any course type to be made by replacing the predictors with values of interest. For example, to make predictions about *applied training* following resident acquisition (ACQ ILT) courses, I would define the model as *applied training* = -0.385 + (.801 x *learning achieved*) + (.007 x *task applicability*) + (.142 x *resources provided*) + (.043 x *manager involvement*). To make predictions for the online acquisition (ACQ SPW) course, I would define the model as *applied training* = -0.022 + (.657 x *learning achieved*) + (.014 x *task applicability*) + (.051 x *resources provided*) + (.201 x *manager involvement*).

A better understanding of the key predictors of learning in DAU courses can be attained by using the regression summary for the *learning achieved* outcome in Table 16. To make predictions for *learning achieved* in resident acquisition (ACQ ILT) courses, I define the model as *learning achieved* = -0.027 + (0.253 x *career benefit*) + (0.044 x *worthwhile investment*) + (0.374 x *exercises value*) + (0.109 x *examples helped*) + (0.100 x *instructor enthusiasm*) + (.047 x *application discussed*). To make predictions for *learning achieved* in online acquisition (ACQ SPW) courses, I define the model as *learning achieved* = 0.945 + (0.308 x *career benefit*) + (0.187 x *worthwhile investment*) + (0.079 x *exercises value*) + (0.107 x *examples helped*) + (0.111x *delivery effective*). The worthwhile construct is a more important predictor for online ACQ courses than for resident ACQ courses. The most important predictor of learning for resident ACQ courses is *exercises value*, which is the variable that best represents transformative, collaborative training techniques applied in the resident courses. Using the study findings, this type of prediction analysis can be done for any course type of interest, which may be helpful when determining the effect on outcomes by efforts to increase predictor values.

Findings Confirm and Extend Knowledge

My study was guided by knowledge in the organizational culture change discipline found in the peer-reviewed literature and theoretical framework described in Chapter 2. In turn, the study findings confirm and extend that knowledge. In the DoD, defense acquisition policy change is implemented across the acquisition workforce in large part by DAU training to enhance policy understanding and facilitate policy-compliant behavior change in the defense acquisition military and civilian workforce. My study findings extended knowledge of the underresearched topic of organizational change implementation using DAU training of the change-resistant DoD acquisition workforce communities responsible for acquiring national security assets.

The findings from Part 1 of the study confirmed the second step in the behavior-before-belief model for culture change (Table 2, p. 137) took place in DAU training. These findings showed that cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards occurred during DAU scenario-based training of cross-functional teams. These findings further confirm the knowledge found in the literature that suggests that transformational, collaborative, active-learning strategies enhance learning (Bass & Riggio, 2010; Burke, 2011; Burns, 2010; Cancian, 2010; Carl & Freeman, 2010; Hackman, 2010; Knowles, 1980; Kotzian, 2010; Maccoby, 2000; Messeri & Richards, 2009; Offermann, 2010; Plachy, 2009; Schein's (2010); Seyranian, 2008; van Eeden, Cilliers, & van Deventer, 2008).

The findings from Part 2 of the study confirmed the third step in the behavior-before-belief model for culture change (Table 2) took place following DAU training.

These findings showed that students' applied the new behaviors learned following DAU policy training courses and determined important predictors of the students' ability to apply these new concepts after the students had returned to the workplace. The knowledge that use of training facilitates behavioral change found in the organization and culture change literature (Bontis et al., 2011; Burr, 2003; Burke, 2011; Bryson, 2011; Clawson, 2012; Eide & Allen, 2012; Schein, 2010; Eide & Allen, 2012; Kotzian, 2010; Knowles, 1980; Mikesell, 2011; Ng'ang'a & Otii, 2013; Nissen, 2012; Novitiski, 2008; Patterson, 2006; Redshaw, 2010; Schein, 2010; Simmons, 2006; Tremaine, 2009) and the knowledge that transformational, collaborative strategies enhance the likelihood of change success (Bass & Riggio, 2010; Bion, 2008; Bontis & Serenko, 2009; Boyne & Walker, 2010; Burke, 2011; Burns, 2010; Cancian, 2010; Carl & Freeman, 2010; Ciulla, 2010; Eide & Allen, 2012; Feiock, Steinacker, & Park, 2009; Hackman, 2010; Herman, 2000; Hofbauer et al., 2011; Hughes, Ginnett, & Curphy, 2010; Karp & Helgø, 2008; Keirsey, 1998; Kotzian, 2010; Maccoby, 2000; Messeri & Richards, 2009; Offermann, 2010; O'Neil, 2011; Plachy, 2009; Rendon, Apte, & Apte, 2012; Schein, 2010; Seyranian, 2008; Stevens, Plaut, & Sanchez-Burks, 2010; van Eeden, Cilliers, & van Deventer, 2008) were confirmed by the study findings that learning achieved in policy courses predicted application on-the-job of behaviors learned. If the new behaviors correct problems and produce better outcomes, then culture change as described in Step 4 of the model (Table 2) should occur.

The study results extend knowledge by provide a better understanding of policy change implementation in DoD, using DAU training to facilitate policy-compliant behavior change that should lead to needed culture change. For each DAU course type, the findings provide key drivers of learning and behavior change following DAU courses. Further confirming knowledge found in the literature, the results indicate that once the value to the student and employer is established, the greatest learning and behavior change occurs following resident courses that provide collaborative teaming experiences not found in online course. These findings confirm that transformative, collaborative training techniques provided in a psychologically safe training environment facilitate behavioral change required to enhance the likelihood of successful implementation of complex policy changes, as suggested by the literature (Bass & Riggio, 2010; Boyne & Walker, 2010; Hackman, 2010; Kotzian, 2010; Masciulli, 2011; Messeri & Richards, 2009; Schein, 2010; van Eeden, Cilliers, & van Deventer, 2008).

The literature provides that environmental change has been accelerated by globalization and technology, requiring transformative, culture change to adapt. Changes in culture, or tacit assumptions, of mature organizations like the DoD cannot, in all likelihood, be successfully implemented and institutionalized directly; however, behavior can be changed by leaders to drive culture change (Burke, 2011; Schein, 2010). DAU training is required for all defense acquisition workforce personnel, so behavior change across the workforce should facilitate Step 4 of the behavior-before-belief model, which is refreezing, or internalizing the new concepts, meanings, and standards in the defense acquisition workforce. This means that the DoD’s efforts to implement complex defense acquisition policy changes should be successful using DAU policy training to address the complexity of the processes involved, the hyper-turbulent environment, and the change-resistant culture of the DoD acquisition workforce (GAO, 2012). This study established that a positive relationship exists between training and policy-compliant behavior; therefore, training is likely an effective contributor to policy change implementation in the DoD.

Limitations of the Study

Quantitative research using large survey datasets is ideal for being able to test specific variable relationships with results generalizable to the whole population, but this type of research is limited in that it does not provide an in depth understanding of the topic studied and it cannot definitively answer the question, why. To answer the question of why the results are what they are, a follow on qualitative study could be conducted. My quantitative research questions were broken down into 13 testable hypotheses that were evaluated using 40 secondary data sample subgroups from DAU surveys to provide unbiased representation of survey participant responses. The regression model was shown to be unbiased so the findings can be generalized to the broader acquisition workforce population. I know this to be true because all necessary underlying assumptions were met. These assumptions include variable types (independent variables are quantitative or categorical and dependent variables are quantitative, continuous, and unbounded), nonzero variance (independent variables), no perfect multicollinearity, homoscedasticity, independent variables are uncorrelated with external variables, independent errors, normally distributed errors, independence (dependent variable values from separate entity), and linearity (Field, 2009; Green & Salkind, 2011). The unbiased regression model presented here is limited in that it models the attitudes and actions of the defense acquisition workforce only and cannot be generalized further to a larger or different population.

SPSS testing did indicate possible multicollinearity concerns which were investigated and the findings confirmed that the variables similar enough to raise concerns did measure different aspects of a construct and added value to the study by providing additional depth of understanding. No perfect multicollinearity was found. Each of the necessary underlying assumptions were tested using SPSS validation techniques and these regression assumptions were met. This means the regression model from the sample is the same, on average, as the regression model from the population, so the findings can be generalized to the defense acquisition workforce populations (Field, 2009). Delimitations, or bounds, of the study are that findings can only be generalized to the defense acquisition workforce personnel population.

A limitation of using an instrument that was not designed specifically to answer my research question is that I could not change the survey to better ensure validity for measurement, to better ensure that I measured what I intended to measure. To mitigate face validity issues, I referenced a previous study by Bontis et al. (2011) that established that the DAU's survey instrument measures what is intended. For content validity, the appropriateness of the variables selected to represent reality for training (variable selected is *learning achieved*) and policy compliance (variable selected is *applied training*) were established when addressing the research question. Content validity was based on my subjective assessment that the DAU survey instrument does appropriately measure the concepts of *learning achieved* of acquisition policy training and *applied training* as a representative variable of application of learned policy-compliant behavior. I mitigated empirical validity concerns by ensuring the measuring instrument shows strong correlation between predicted and obtained results. I mitigated construct validity concerns by relating the measuring instrument to my theoretical framework (Frankfort-Nachmias & Nachmias, 2008).

Internal validity concerns caused by the possibility that study outcomes could be influenced by other factors were mitigated by testing applicable covariates in 40 subgroups to ensure that I understood the nature of relationships being tested. Validity for the quantitative research design was not a concern since I can draw meaningful and useful inferences from scores on the DAU survey instruments. No internal threats due to research activities that decrease my ability, as a researcher, to make accurate inferences about the population from the data collected were noted. External threats were mitigated by avoiding making inaccurate inferences from the data with regards to persons, settings, or times not represented by the study (Creswell, 2009).

The validity and reliability of the DAU survey instrument was determined by the Bontis et al. (2011) study. For construct reliability, a Cronbach's alpha of .8 or higher was calculated for all constructs used to capture DAU survey data, indicating that participants accurately interpreted survey item meanings. There is general agreement in the literature supporting alpha greater than .8 as a good measure of construct reliability (Bentler, 2009; Carmines & Zeller, 1979; Cizek, Rosenberg, & Koons, 2008; Flora & Curran, 2004; Green & Yang, 2009; Liu, Wu, & Zumbo, 2010; Osburn, 2000; Schmitt, 1996; Sijtsma, 2009; Tavako & Dennick, 2011; Zinbarg, Revelle, Yovel, & Li, 2005).

Survey item validity was measured using loading values (lamda) to test whether the items measured what they were supposed to measure. For all cases, the minimum threshold of 0.70 was exceeded, which means that the DAU measurement instruments used to collect the secondary data set that I analyzed are valid (Bollen, 1989; Bontis et al., 2011; Nunnally & Bernstein, 1994). No limitations to validity, reliability, or generalizability to the defense acquisition workforce population arose from execution of the study.

Recommendations

My quantitative research study found that the Defense Acquisition University's (DAU's) scenario-based training that emphasizes collaborative teaming is a key driver of policy-compliant behavior change in Department of Defense (DoD) acquisition personnel. This study found that benefit of the training to career and employer, as well as, the DAU's transformative, active-learning training techniques were the most important predictors of learning new concepts in all DAU courses. A limitation of a quantitative study is the inability to gain an in depth understanding of why the results are what they are, so a follow on qualitative study could be conducted to gain greater insight into why drivers of learning are more important in some DAU courses than others. This insight would be helpful in optimizing improvement strategies to enhance learning which drives application of learned behavior in the workplace.

A future study may be necessary to determine which acquisition personnel will experience the most benefit from which types of DAU training to ensure "the right butts in seats." Future studies should also focus on the questions of how to further enhance the success of scenario-based, active learning by cross-functional, collaborative teams in residence courses and how to extend those techniques to online courses. The instructor variables tend to have the highest mean survey scores even though regression analysis results indicated that the instructor variables are the least important of the predictors of learning tested. The Bontis et al. (2011) study found that DAU instructors have a stronger effect on learning, almost twice as large, when compared to the Knowledge Advisors corporate university benchmark. A future study might focus on the question of how instructors can more directly drive learning in their classrooms.

To enhance behavior change, other than through enhanced learning, further investigation may be needed to increase work task applicability, establish what resources are needed to apply learned knowledge/skills, and to determine how best to help managers of defense acquisition personnel understand their role in enhancing application of learned knowledge/skills in the workplace. Additional studies should also be conducted to determine the utility of the behavior-before-belief model of culture change for other organizations. Although, this study has found DAU training to be a key contributor to implementing defense acquisition policy by driving policy-compliant behavior change in the defense acquisition workforce, there is still work to be done to gain an in depth understanding of how best to increase learning in DAU courses, which is the most important predictor of the behavior change needed to overcome the ongoing defense acquisition problems prevalent in the literature.

Implications

Potential positive social change impacts of this study have been addressed at individual, organizational, and policy levels from empirical and theoretical perspectives and recommendations for practice have been discussed in the previous section. Public policy can be an effective and legitimate instrument for implementing needed social change. For this study, the empirical implications for social change included informing policymakers of the importance of formal acquisition training using transformative training techniques in implementing needed culture change in the defense acquisition workforce. Dissemination of defense acquisition policy that articulates the policymakers' vision and goals can facilitate implementation of organizational culture change by first creating behavioral changes in individuals (Burke, 2011). Positive social change is implied at the DoD organization level by enhancing the effectiveness of scenario-based training emphasizing cross-functional teaming to increase policy-compliant behavior that may lead to greater effectiveness and efficiency of the acquisition community, who are stewards of both the taxpayer dollars and warfighter materiel solutions.

The theoretical implications are best described using the behavior-before-belief model of culture change (Table 2, p. 137) adapted from Schein's (2010) theories on organizational culture and leadership. The study found that the second step in the behavior-before-belief model in which cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards occurs during DAU scenario-based training of collaborative teams. The study also found that the third step occurs in which the students are able to apply new behaviors learned following DAU policy training courses in the workplace. The study found that learning achieved in policy courses predicted on-the-job application of behaviors learned. If the new behaviors correct problems and produce better outcomes, then positive culture change as described in Step 4 of the model (Table 2) should occur.

This study may support positive social change by providing a better understanding of policy change implementation in DoD, using DAU training to facilitate policy-compliant behavior change that should lead to needed culture change. For each DAU course type, the study findings provide key drivers of learning and behavior change following DAU courses. Transformative, collaborative training techniques provided in a psychologically safe DAU training environment facilitate behavioral change required to enhance the likelihood of successful implementation of complex acquisition policy changes.

Conclusion

Responsible for national security, the DoD requires transformative culture change in the acquisition of defense systems to adapt to environmental changes accelerated by globalization, technology, and fiscal instability. It is well-documented that culture change in mature organizations like the DoD cannot be successfully implemented directly; however, behavior can be changed by leaders to drive culture change. Little is known about the drivers of behavior change in the defense acquisition workforce. The purpose of this study was to bridge this gap in knowledge by investigating the relationship between mandated acquisition training and application of policy-compliant behavior.

The study was conducted to address the quantitative research question: To what extent does the DAU scenario-based policy training of cross-functional acquisition teams enhance policy-compliant behavior of the DoD acquisition workforce personnel? To find the answer to this question, two additional questions were posed: What are the important predictors of learning new concepts and behaviors in DAU training, and what are the important predictors of application of learned concepts from DAU training? Application of learned concepts from DAU policy training was the policy-compliant behavior change tested in this study.

The importance of creating behavior change to launch culture change dictated the use of a behavior-before-belief model of culture change (Table 2) that was adapted from Schein's (2010) organizational culture and leadership theory and three-stage model of learning/change to guide the research. The expanded model added applying new behaviors to Schein's original model. The steps in the behavior-before-belief model are: 1) Unfreezing the organization by creating the motivation to change; 2) Cognitive restructuring through learning new concepts, new meanings for old concepts, and new judgment standards; 3) Applying new behaviors learned to correct problems and produce better outcomes; and, 4) Refreezing, or internalizing the new concepts, meanings, and standards (Schein, 2010).

The research was conducted in two parts focusing of Steps 2 and 3 of the expanded model. Part 1 of the study tested student learning of new concepts in DAU policy training courses and determined the predictors of learning. Part 2 of the study examined students' on-the-job application of new behaviors learned following DAU policy training courses and determined the predictors of the students' ability to apply the training.

The quantitative, ex post facto, longitudinal study design used multiple regression techniques to analyze 19-months of DAU secondary survey data. The secondary data collected and maintained by the DAU provided the data required for my data analysis effort, which was designed to generate results that are representative of and can be generalized to the defense acquisition workforce population of approximately 150,000 military and civilian personnel (DAU, 2011; GAO, 2012). All acquisition personnel are required to attend DAU career-field specific certification training (Fishpaw, 2010). Eligible study participants were defense acquisition workforce members who responded to DAU online postevent and follow-up surveys following training events during a 19-month period from 1 January 2014 and 31 July 2015. I further divided the DAU sample of more than 334,000 DAU training events into 40 course type subgroups to avoid bias inequality by ensuring internal homogeneity of subgroups (Frankfort-Nachmias & Nachmias, 2008).

The 40 subset samples were broken out by postevent or follow-up survey type and for the covariates, delivery type and functional topic. The postevent survey data, collected at the end of each course, supported regression analysis of predictors of the *learning achieved* outcome. The follow-up survey data, collected 60-days post course, provided the data needed for regression analysis of predictors of the *applied training* outcome.

A probability sampling design allowed me to ensure that all units of the defense acquisition population had an equal probability of being included in the sample (Frankfort-Nachmias & Nachmias, 2008). A stratified random sampling technique was used, since subset proportions in the DAU secondary data were known (Field, 2009). I conducted an a priori power analysis to determine appropriate minimum sample sizes of roughly 50 to 790 depending on effect size for a linear multiple regression fixed model with an *R*-squared deviation from zero (null hypothesis *F*-test). Actual sample sizes ranged from roughly 180 to 2150. The study found that the important predictors of *applied training* and *learning achieved* have large effect sizes, therefore all samples were adequately sized for the regression analysis.

Results determined important predictors of the learning achieved and application of learned concepts outcomes. When a nonspurious relationship was found, I rejected the null hypothesis and elaborated the conditions under which the relationship exists. A strong causal relationship exists between the predictors, *career benefit*, *worthwhile investment,* and *exercises value*, and outcome, *learning achieved,* since the relationship did not disappear for any of the 40 covariate subgroups tested (Frankfort-Nachmias & Nachmias, 2008). Interaction of the other covariates were examined since the size or direction of the association between the predictors and the outcome, *learning achieved*, were greater in one covariate subgroup than another or disappeared altogether indicating a conditional relationship exists. Conditional relationships were found to exist between the predictor variables *examples helped*, *instructor enthusiasm*, *application discussed*, *instructor knowledge*, *delivery effective,* and *graphics meaningful* and the outcome, *learning achieved,* dependent on course type.

The study also found that concepts learned from DAU policy training are applied in the defense acquisition workplace and that the most important predictor of this application of learning was the *learning achieved* variable, which measured whether the student learned new knowledge and skills from the DAU training. This variable was found to be a highly significant predictor and the most important predictor of the *applied training* outcome for all DAU courses, accounting for greater than 50% of the variability in the *applied training* outcome for most courses. Increasing *learning achieved* in DAU policy training increases application of the policy-compliant behavior learned in the defense acquisition workplace. These findings support acceptance of the research hypothesis that there is a highly significant positive correlation between *learning achieved* and *applied training* and that *applied training* can be predicted from *learning achieved* for all DAU training courses. Application of learned concepts from DAU training was the policy-compliant behavior change tested; therefore, this study finds that the DAU scenario-based policy training of cross-functional acquisition teams does enhance policy-compliant behavior of the DoD acquisition workforce personnel.

Another highly significant predictor of *applied training* for all DAU courses was the *task applicability* variable, which measured the percentage of total work time spent on tasks that required the knowledge/skills presented in the training. This finding indicates that to increase application of training on the job, the DoD needs to ensure that the personnel who can use the training on the job are the personnel who are given the training. This variable also supports the worthwhile construct and adds further support to the importance of “having the right butts in seats” in DAU courses to increase policy-compliant behavior in the defense acquisition workplace. Conditional relationships exist between *resources provided* and *manager involvement* and the outcome, *applied training*, dependent on the type of course.

A highly-turbulent environment is driving the need for transformative culture change in the DoD's acquisition workforce. This study found DAU training to be a key contributor to implementing defense acquisition policy by driving policy-compliant behavior change in the defense acquisition workforce. If the behavior change leads to better acquisition outcomes, then a shift in the underlying assumptions leading to the required culture change can occur. The implications for social change include informing policymakers of the importance of formal acquisition training using transformative training techniques in implementing needed culture change in the defense acquisition workforce.

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Appendix A: Acronym List

Acquisition category (ACAT)

Acquisition, Technology, and Logistics (AT&L)

Advocacy coalition framework (ACF)

Assistant Secretary of the Navy (ASN)

Budget authority (BA)

Budget Estimate Submission (BES)

Capability Development Document (CDD)

Capability Production Document (CPD)

Chairman, Joint Chiefs of Staff (CJCS)

Combatant commands (COCOMs)

Complex adaptive systems (CAS)

Component acquisition executive (CAE)

Cost Assessment and Program Evaluation (CASE)

Defense Acquisition Board (DAB)

Defense Acquisition Executive (DAE)

Defense Acquisition Management System (DAMS)

Defense Acquisition System (DAS)

Defense Acquisition University (DAU)

Defense Acquisition Workforce Improvement Act (DAWIA)

Defense Business Board (DBB)

Defense Federal Acquisition Regulation Supplement (DFARS)

Department of Defense (DoD)

Department of the Navy (DoN)

Deputy Secretary of Defense (DEPSECDEF)

Doctrine, organization, training, materiel, leadership and education, personnel, facilities (DOTMLPF)

DoD Directive (DoDD)

DoD Instruction (DoDI)

Engineering and Manufacturing Development (EMD)

Evolutionary Acquisition (EA)

Federal Acquisition Regulation (FAR)

Fiscal Year (FY)

Future Years Defense Program (FYDP)

Government Accountability Office (GAO)

House Appropriations Committees (HAC)

House Armed Services Committee (HASC)

Integrated Product and Process Development (IPPD)

Integrated Product Team (IPT)

Joint Capabilities Integration and Development System (JCIDS)

Joint Requirements Oversight Council (JROC)

Joint Staff (JS)

Knowledge Advisors (KA)

Life Cycle Cost (LCC)

Life Cycle Management (LCM)

Major Defense Acquisition Programs (MDAPs)

Materiel Solution Analysis (MSA)

Metrics that Matter (MTM)

Milestone Decision Authority (MDA)

National Defense Strategy (NDS)

National Security Council (NSC)

National Security Strategy (NSS)

National Security Systems (NSS)

Office of Management and Budget (OMB)

Office of the Inspector General (IG)

Office of the Secretary of Defense (OSD)

Operation and maintenance (O&M)

Operations and support (O&S)

Organization Development (OD)

Organization Transformation (OT)

Overarching IPTs (OIPTs)

Planning, Programming, Budgeting and Execution (PPBE)

President's Budget (PB)

Production and Deployment (P&D)

Program element (PE)

Program Executive Officer (PEO)

Program Manager (PM)

Program Objectives Memorandum (POM)

Program office (PO)

Program-level IPTs (PIPTs)

Quality control (QC)

Research and development (R&D)

Research, development, test, and evaluation (RDT&E)

Resource Allocation Process (RAP)

Return on investment (ROI)

Secretary of Defense (SECDEF)

Selected Acquisition Report (SAR)

Senate Appropriations Committees (SAC)

Senate Armed Services Committee (SASC),

Strategic Management Plan (SMP)

Statistical Package for the Social Sciences (SPSS)

Technology Development (TD)

Total Ownership Cost (TOC)

Under Secretary of Defense for Acquisition, Technology, and Logistics (USD [AT&L])

United States Code (U.S.C.)

Weapon Systems Acquisition Reform Act (WSARA)

Appendix B: Data Use Agreement

DATA USE AGREEMENT

This Data Use Agreement ("Agreement"), effective as of 5 October 2015 ("Effective Date"), is entered into by and between Therese Bensch ("Data Recipient") and the Defense Acquisition University ("Data Provider"). The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in research **in accord with laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program.** In the case of a discrepancy among laws, the agreement shall follow whichever law is more strict.

1. Definitions. Due to the study's affiliation with Laureate, a USA-based company, unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the USA "HIPAA Regulations" and/or "FERPA Regulations" codified in the United States Code of Federal Regulations, as amended from time to time.

2. Preparation of the LDS. Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program.

3. Data Fields in the LDS. **No direct identifiers such as names may be included in the Limited Data Set (LDS).** In preparing the LDS, Data Provider shall include the **data fields specified as follows**, which are the minimum necessary to accomplish the research: Data from Metrics that Matter (MtM) End of Course Surveys and Follow-On Surveys.

4. Responsibilities of Data Recipient. Data Recipient agrees to: a. Use or disclose the LDS only as permitted by this Agreement or as required by law;

b. Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;

c. Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;

d. Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and

e. Not use the information in the LDS to identify or contact the individuals who are data subjects.

5. Permitted Uses and Disclosures of the LDS. Data Recipient may use and/or disclose the LDS **for its Research activities only.**

6. Term and Termination. a. Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.

b. Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.

c. Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

d. For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

e. Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

7. Miscellaneous. a. Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.

b. Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

c. No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

d. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

e. Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

DATA PROVIDER	**DATA RECIPIENT**
Signed: ANDERSON.BRIAN.K.1169589280	Signed: BENSCH.THERESE.CLAIRE.1173993788
Print Name: Brian Anderson	Print Name: Therese Bensch
Print Title: West Region Director of Research	Print Title: