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**A COMPARATIVE ASSESSMENT OF KNOWLEDGE MANAGEMENT EDUCATION
ACROSS THE UNITED STATES DEPARTMENT OF DEFENSE**

THESIS

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AFIT/GIR/ENV/07-M17

**DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY**

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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AFIT/GIR/ENV/07-M17

A COMPARATIVE ASSESSMENT OF KNOWLEDGE MANAGEMENT
EDUCATION ACROSS THE UNITED STATES DEPARTMENT OF DEFENSE

Presented to the Faculty

Department of Systems Engineering and Management

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In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Information Resource Management

Gary Lee Wright, BS

Captain, USAF

March 2007

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EDUCATION ACROSS THE UNITED STATES DEPARTMENT OF DEFENSE

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Abstract

Knowledge is a critical resource for organizations today, especially to the DoD. When organizations understand what knowledge is, they can begin to draw value from it. Drawing value from knowledge is best accomplished through the processes of knowledge management: knowledge creation, knowledge storage and retrieval, knowledge transfer, and knowledge application (Alavi and Leidner, 2001). Organizations can create an environment in which these processes flourish by ensuring the organization has the elements of a supportive leadership, structure to control and optimize knowledge sharing, technology to facilitate the KM processes, and a commitment to maximize knowledge sharing and continuously improve (Stankosky et al, 1999).

KM education is the means by which organizations can successfully develop an understanding of KM, and those organizational elements required to implement and institutionalize KM. Statistical evidence shows that those organizations that do not adequately address KM education are more likely to fail with their KM systems (Koenig, 2004). Organizations desiring to capitalize on knowledge should then ensure that their KM education efforts are effective by establishing education goals, developing a curriculum to meet these goals, and continuously evaluating goal attainment. This case study research documents how the DoD is addressing knowledge management education.

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Gary Lee Wright

Table of Contents

	Page
Abstract.....	iv
Table of Contents.....	vi
List of Figures.....	vi
List of Tables.....	vii
I. Introduction.....	1
Overview.....	1
Research Question.....	2
Methodology.....	3
Significance.....	3
Thesis Overview.....	3
II. Literature Review.....	4
Importance of Knowledge.....	4
Importance of Knowledge in the DoD.....	5
Knowledge Defined.....	5
KM Defined.....	6
KM Education.....	9
Importance of KM Education.....	9
Effective Education Program Elements.....	10
Summary.....	11
III. Methodology.....	13
Case Study Research.....	13
Necessary Components of Case Study Research.....	15
Quality and Reliability of Case Study Research.....	16
Research Limitations and Biases.....	17
IV. Analysis.....	19
IQ1: What is the perceived importance of KM education?.....	19
IQ2: What is the nature of the programs in place to educate for KM?.....	22
IQ3: Who has developed the KM education programs?.....	28
IQ4: What do the curricula consist of?.....	29
IQ5: What are the goals and expected outcomes of KM education?.....	35
IQ6: How are metrics used to evaluate KM education outcomes?.....	37
IQ7: What issues have arisen while trying to educate members about KM?.....	38
Summary.....	41

	Page
V. Discussion, Conclusions, and Recommendations.....	43
Discussion and Conclusions.....	43
Recommendations.....	46
Suggestions for Further Study.....	48
Chapter Overview.....	49
Appendix A: Definition of Acronyms.....	51
Bibliography.....	53

List of Figures

	Page
Figure 1 – Why KM Benefits Failed to Meet Expectations (Koenig, 2004)	10

List of Tables

	Page
Table 1 – Definitions of Knowledge (Stenmark, 2002).....	7
Table 2 – Organizational Elements Conducive to KM (Holsapple and Joshi, 1998) ...	8
Table 3 – Qualitative Approach Characteristics (Leedy and Ormrod, 2005).....	14
Table 4 – DoD KM Education Findings.....	42

A COMPARATIVE ASSESSMENT OF KNOWLEDGE MANAGEMENT EDUCATION ACROSS THE UNITED STATES DEPARTMENT OF DEFENSE

I. Introduction

Overview

Knowledge has become a critical resource for organizations in a globalized world. Drucker (1993) has declared that knowledge has surpassed capital and property as the most important source of value for organizations. Nonaka (1998) has identified knowledge as the one sure source of competitive advantage in a global economy. Knowledge has become just as important to the Department of Defense (DoD) as it operates throughout the world. Working with joint and combined partners, the DoD is attempting to create a force that is capable of innovatively applying personnel and materiel to meet any threat. The 2006 Quadrennial Defense Review (QDR) shows that in order to do this, operations must shift from focusing on weaponry to information, knowledge, and intelligence (Quadrennial Defense Review, 2006). The Capstone Concept for Joint Operations (2005) and 2004 National Military Strategy identify knowledge as a fundamental enabler of joint operations and warfighting.

Since knowledge is such an important resource for the military, it becomes an incumbent priority to understand what knowledge is, and how organizations can manage their knowledge. Numerous definitions of knowledge exist, but this research uses the definition put forth by Davenport and Prusak: “a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and

information (2000, p. 5).” Knowledge Management (KM) seeks to draw value from knowledge by using it in several processes. Alavi and Leidner (2001) succinctly described these KM processes as knowledge creation, knowledge storage and retrieval, knowledge transfer, and knowledge application. Organizations addressing key elements in order to foster KM initiatives composed of these knowledge processes stand the greatest chances for success. Stankosky (2005) categorized these four critical elements as leadership, organization, technology, and learning. Isolating the final element, Bassi (1999) and Choi (2000) identified KM education as a success factor for KM. Further, a 2000 study by KPMG Consulting showed that inadequate user education and training was to blame in 53% of KM system failures. This research will focus on KM education within the context of the DoD.

Research Question

Since knowledge is such an important resource, especially to the DoD, it is equally important to properly manage it. Organizations like the DoD can increase their chances of successfully implementing KM initiatives by addressing KM education. This research will seek to answer the following question:

How is the DoD addressing KM education?

In order to answer this question, this research seeks to answer the following investigative questions within the context of each military service:

IQ1: What is the perceived importance of KM education?

IQ2: What is the nature of the programs in place to educate for KM?

IQ3: Who has developed the KM education programs?

IQ4: What do the curricula consist of?

IQ5: What are the goals and expected outcomes of KM education?

IQ6: How are metrics used to evaluate KM education outcomes?

IQ7: What issues have been encountered while trying to educate members about KM?

Methodology

This research will use a case study research design to answer the research question. The research design designates each service within the DoD (Air Force, Army, Navy/Marine Corps) as individual cases, and analyzes service-wide education programs as the unit of analysis. By collecting converging data from interviews, documents, and information portals, this research will provide a rich narrative on how the DoD is addressing KM education.

Significance

This research will serve to identify strengths and key practices of KM education approaches within the DoD. This will serve as feedback to each service on their KM education approach, provide the services with possible benchmarks, and call attention to possible gaps in KM education approaches.

Thesis Overview

Chapter One contains a broad overview and general background to this research effort. Chapter Two includes: 1) a review of existing literature on the importance of knowledge and KM to the DoD, 2) a definition of knowledge and KM, 3) an explanation of the necessity for KM education, and 4) an examination of effective education program elements. Chapter Three discusses the case study methodology used to conduct the research. Chapter Four summarizes the results of the research. Chapter Five contains a discussion about findings, conclusions drawn from the research, and recommendations for improved KM education efforts and future research.

II. Literature Review

This chapter reviews existing literature on the general importance of knowledge, and the importance of knowledge to the DoD. It provides a definition of knowledge and KM to be used throughout the thesis. It discusses the processes of KM, and the organizational elements that create an environment for KM to flourish. It discusses what KM education is, and why KM education is a crucial component of successfully implementing KM. It concludes with an examination of elements that make up effective education programs.

Importance of Knowledge

Drucker (1993) was one of the first individuals to identify knowledge as a critical resource to organizations today. He concludes that knowledge has surpassed capital, realty, and other resources in their importance to organizations operating on a global level. Drucker states that, “value is now created by ‘productivity’ and ‘innovation,’ both applications of knowledge to work (1993, p. 8).” Nonaka (1998) argues that organizations are limited in distancing themselves from competitors when operating on a global level. He continues that organizations today will find that, “the one sure source of lasting competitive advantage is knowledge (1998, p. 22).” Quinn, Anderson, and Finkelstein (1998) add that knowledge is essential to commercial success, and that “the success of a corporation lies more in its intellectual ... capabilities than in its physical assets (p. 182).”

Drucker (1993) demonstrates that knowledge is important to more than commercial organizations. In 1993, developed countries were spending nearly one-fifth of their gross national product on knowledge production and dissemination. Governments have determined knowledge to be such an important resource, and their militaries, too, are finding knowledge to be an important resource.

Importance of Knowledge in the DoD

The 2006 QDR introduces future direction for the DoD from its most senior military and civilian leaders. The QDR acknowledges the ambiguity of current and future military operations and emphasizes the need for joint and combined operations that apply personnel and materiel more effectively than adversaries. In order to do this, the QDR calls for a shift in focus from weapon platforms to information, knowledge, and actionable intelligence. The Capstone Concept for Joint Operations (2005) declares that this focus on knowledge is fundamental to joint operations. Military forces will be more empowered and more effective, as they acquire, refine, and share knowledge. When they can do this, they can see and act before an adversary can. The National Military Strategy (2004) echoes this sentiment and declares that knowledge and knowledge sharing enhance joint warfighting.

Knowledge Defined

If knowledge is such an important resource, it is necessary to establish a definition of knowledge. Nonaka and Takeuchi (1995), Quinn et al (1998), and Davenport and Prusak (2000) argue that knowledge extends beyond that which is obtained merely from specialized training or education. They state that knowledge resides just as much in the development and execution of business processes and methods. As people perform these actions, they make different judgements which are an important component of knowledge. Indeed, Davenport and Prusak (2000) and the American Productivity and Quality Center (APQC, 2000) identify this component of knowledge, which resides strictly within individuals, as the richest and most valuable form of knowledge. Nonaka and Takeuchi (1995) and Drucker (1993) state that another fundamental aspect of knowledge is its tie to action. Applying knowledge to work is its true source of value.

While Table 1 summarizes these and many other different definitions of knowledge, this research will use the definition of knowledge set forth by Davenport and Prusak (2000): “a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information (2000, p. 5).”

KM Defined

As previously stated, organizations draw true value from knowledge by applying knowledge to work. Organizations accomplish this application of knowledge to work through the various processes of KM. Davenport and Prusak (2000) identified these processes as knowledge generation (creating knowledge), knowledge codification (capturing knowledge in a format that can be shared with others), knowledge use (distributing codified knowledge to those people in need), and knowledge application (applying knowledge to work and decision-making). Stankosky (2005) identified the similar KM processes of knowledge use, knowledge transfer, knowledge codification, and knowledge generation, but added the additional process of knowledge assurance (knowledge integrity, authentication, and availability). Shultze and Leidner (2002) subdivided the KM processes into knowledge generation, knowledge representation, knowledge storage, knowledge transfer, knowledge transformation, knowledge application, knowledge embedding, and knowledge protection. For the sake of simplicity, this research uses Alavi and Leidner’s (2001) KM processes of knowledge creation, knowledge storage and retrieval, knowledge transfer, and knowledge application.

Organizations can most successfully use and capitalize on these KM processes when they provide a conducive environment for KM implementation. While reviewing KM frameworks, Rubenstein-Montano et al. (2001) identified elements of a conducive organizational environment for KM as business objectives (linking KM strategic business objectives), technology (adequate

Table 1 – Definitions of Knowledge (Stenmark, 2002)

Source	Definition
APQC (2000)	“Knowledge is ‘valuable information in action,’ with value being determined through the eyes of the organization and the recipient... information doesn’t become knowledge unless a human being or group of people can add context to it and put it into use. Most scholars agree that knowledge comes in two forms: tacit – which includes experience, know-how, skills, and intuition and is most often embedded in the individual – and explicit – which is information you can easily put into words or pictures or that is easy to articulate and communicate.”
Choo, Detler, and Tumbull (2000)	Justified, true beliefs.
Davenport and Prusak (2000)	“Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms. Knowledge can and should be evaluated by the decisions or actions to which it leads.”
Drucker (1993)	“Knowledge proves itself in action. What we mean by knowledge is information effective in action, information focused on results. These results are seen outside the person – in society and economy, or in the advancement of knowledge itself. To accomplish anything, this knowledge has to be highly specialized... converts ad hoc experience into system ... anecdote into information ... skill into something that can be taught and learned.”
Nonaka and Takeuchi (1995)	“First, knowledge ... is about beliefs and commitment. Knowledge is a function of a particular stance, perspective, or intention. Second, knowledge ... is about action. It is always knowledge ‘to some end.’ And third, knowledge ... is about meaning. It is context-specific and relational. We consider knowledge as a dynamic human process of justifying personal belief toward the ‘truth.’”
Quigley and Debons (1999)	Text that answers the questions, “why,” or “how.”
Quinn, Anderson, and Finkelstein (1998)	“Cognitive knowledge (or know-what) is the basic mastery of a discipline that professionals achieve through extensive training and certification.”
Spek and Spijkervet (1997)	The ability to assign meaning.
Wigg (1993)	Truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and know-how.

information technology and communications infrastructure) culture and people (the willingness of knowledge users and owners to share their knowledge), and learning (iterative review of actions for continued improvement while maximizing knowledge sharing). Holsapple and Joshi's (1998) Delphi Study of KM frameworks identified the organizational elements of managerial influence (leadership and control), resource influence (human, knowledge, financial, material), environmental influence (markets, competitors, and timing), and learning. Table 2 summarizes some of the other organizational elements analyzed in their Delphi Study. This research uses the organizational elements put forth by Stankosky (2005): leadership (strategic oversight and decision-making), organization (operational control and optimization), technology, and learning.

Table 2 – Organizational Elements Conducive to KM (Holsapple and Joshi, 1998)

Author	Influences on the Conduct of Knowledge Management
Leonard-Barton, 1995	<ol style="list-style-type: none"> 1. Managerial systems (e.g., education, reward, and incentive systems) 2. Values and norms (e.g., system of cast and status, rituals of behaviors, passionate beliefs)
Arthur Andersen and APQC, 1996	<ol style="list-style-type: none"> 1. Culture 2. Leadership 3. Measurement 4. Technology
Wiig, 1993	<ol style="list-style-type: none"> 1. Exploring knowledge and its adequacy (survey & categorize knowledge, analyze knowledge & related activities, elicit, codify & organize knowledge) 2. Assessing value of knowledge (appraise & evaluate knowledge and related activities) 3. Managing knowledge activity (synthesize knowledge related activities; handle, use and control knowledge, leverage, distribute, automate knowledge)
van der Spek and Spijkervet, 1997	<ol style="list-style-type: none"> 1. Conceptualize (gain insights about the conduct of KM) 2. Reflect (access qualities and plan improvements) 3. Retrospect (evaluating the performance of the knowledge manipulation activities and the result from those activities) <p>Items 1, 2, and 3 guide the structuring of knowledge manipulation activities.</p> <ol style="list-style-type: none"> 4. Internal developments (culture, employee motivation, organizational adjustments, management, technology) 5. External developments
Szulanski, 1996	<ol style="list-style-type: none"> 1. Characteristics of knowledge transfer (includes causal ambiguity and unproveness) 2. Characteristics of knowledge source (includes lack of motivation, perceived unreliability) 3. Characteristics of knowledge recipient (includes lack of motivation, absorptive and retentive capacity) 4. Characteristics of the context (includes barren organizational context and arduous relationship)

KM Education

Hosapple and Joshi (1999) identified the lack of understanding and lack of comprehension of the concept of KM as a cause for ineffective management of knowledge. KM education combats this lack of comprehension and provides an understanding of the nature of organizational knowledge and its proper management. Alavi and Leidner (2001) state that people that have this understanding can then embody KM principles in their individual actions as well as organizational practices and culture. They also find that KM system designers with this understanding can more successfully design information technologies to support and augment KM activities. Organizations that address KM education stand to experience greater success in initiating and cultivating KM initiatives.

Importance of KM Education

Davenport and Prusak (2000), Bassi (1999), and Choi (2000) identify education as a crucial component of KM success. McDermott et al (1999) elevated the importance of KM education by asserting that KM education would determine the ultimate success or failure of KM initiatives. Those organizations adequately addressing KM education overwhelmingly have successful KM initiatives. KPMG Consulting (2000) published compelling statistical evidence for this assertion in a report on the status of KM system implementation in more than 400 organizations. According to the KPMG report data, Koenig (2004) found that inadequate user training and education was the source of 53% of all failed KM systems, as depicted in Figure 1. Koenig (2004) and Davenport and Prusak (2000) admit that education can be blamed for failure when cultural resistance is the real culprit. However, this further solidifies the importance of KM education to overall success.

Lovelady (1984), Mohrman et al. (1989), and Zemke (2000) have all found that education is generally the most effective tool for reducing cultural resistance and institutionalizing change. Education is effective because it applies Lewin’s (1947) three-stage learning process to change: unfreezing (demonstrating the reason for, and necessity of, change within an organization), moving (providing people with the necessary skills and training to effectively employ the proposed change into daily work routines), and refreezing (institutionalizing the change).

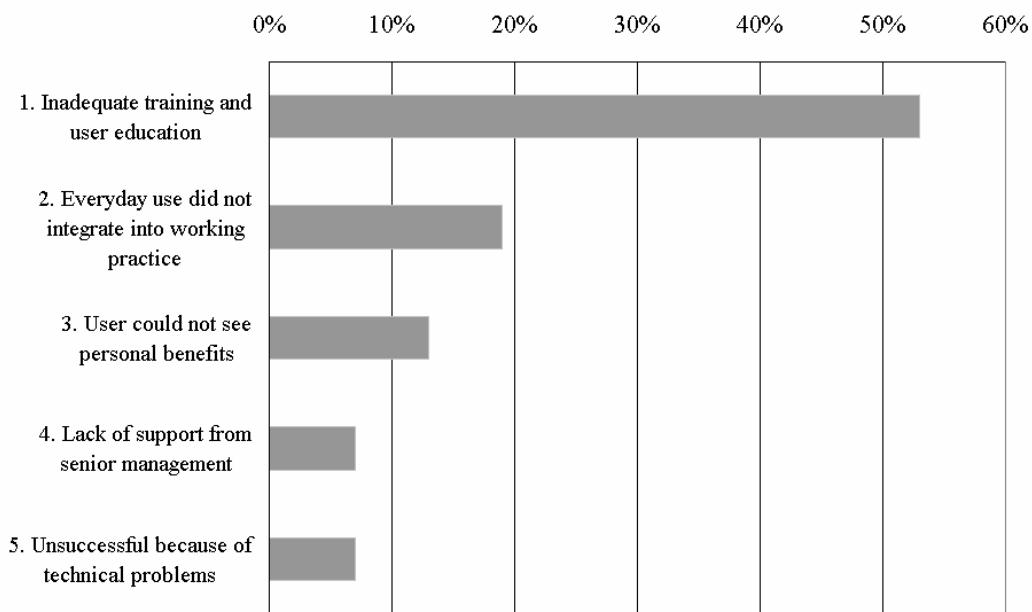


Figure 1 – Why KM Benefits Failed to Meet Expectations (Koenig, 2004)

Effective Education Program Elements

For education programs to be effective, they should incorporate several elements. Light and Cox (2001) find that the basic elements of effective education are: 1) good learning goals; 2) good curriculum materials for achieving those goals; and, 3) good methods of evaluating whether and how those goals are achieved. Sherman et al (2001) state that organizations will work to incorporate these basic elements into education programs they deem important.

Adequate resources and a regard for the educational program as generally important provide an environment for successful performance.

Lynton and Elman (1987) state that organizations must establish education program goals to be effective. As organizations and education programs focus on achieving these goals, they have an inherent guide for curriculum and program development and implementation. Glaser and Nitko (1971) and Lynton and Elman (1984) find that subject matter experts, with input from academia and practitioners, should design the curriculum. This assures that the program provides relevant and accurate material.

Ensuring that this material is appropriately continued, modified, or expanded is part of the third element. Anderson and Ball (1978) identify constant evaluation by collecting and analyzing data in the form of test scores, questionnaires, interview data, logs and diaries, observations, and ratings serve as effective evaluation mechanisms for most educational programs. Glaser and Nitko (1971) further clarify that those measures most relevant to the education program system provide an important feedback mechanism for curriculum development and implementation.

Summary

Knowledge is a critical resource for organizations today, especially to the DoD. In order to operate on a joint and combined level around the world, the DoD will have to focus on knowledge (QDR, 2006). When organizations understand what knowledge is, they can begin to draw value from it. Drawing value from knowledge is best accomplished through the processes of KM: knowledge creation, knowledge storage and retrieval, knowledge transfer, and knowledge application (Alavi and Leidner, 2001). Organizations can create an environment in which these processes flourish by ensuring the organization has the elements of a supportive

leadership, structure to control and optimize knowledge sharing, technology to facilitate the KM processes, and a commitment to maximize knowledge sharing and continuously improve (Stankosky et al, 1999). KM education is the means by which organizations can successfully develop an understanding of KM and those organizational elements required to implement and institutionalize KM. Statistical evidence shows that those organizations that do not adequately address KM education are more likely to fail with their KM systems (Koenig, 2004). Organizations desiring to capitalize on knowledge should then ensure that their KM education efforts are effective by establishing goals for their efforts, developing a curriculum to meet these goals, and continuously evaluating how well they are achieving these goals.

III. Methodology

This chapter describes the case study research methods used determine how the DoD is addressing KM. It does so by discussing the appropriateness of case study research to answer the research question, identifying the necessary components of case study research, reviewing how the case study research address quality and reliability, and by concluding with admitted limitations and biases.

Case Study Research

Patton (2002) stated that qualitative inquiry is oriented toward exploratory research. According to Leedy and Ormrod's (2005) characteristics of qualitative research, summarized in Table 3, this research is best conducted by following a qualitative approach. A qualitative approach is appropriate because: 1) this research seeks to explore how the DoD is addressing KM education; 2) research takes a holistic view of these KM approaches; 3) collects data through interviews and document review; 4) searches for themes in KM education approaches while acknowledging limitations and biases; and, 5) communicates findings in a rich narrative.

Yin (2003) states that there are five types of research strategies for exploratory research: experiments, surveys, archival analyses, histories, and case studies. This research follows the case study strategy to determine how the DoD is addressing KM education. Benbasat et al (1987) confirms the appropriateness of case study research for areas in which few previous studies have been carried out. Ruth et al (1999, 2000) show us that what little research has been carried out on KM education has been confined to overviews of instructional programs, or courses designed for KM professionals. At the time of publishing, no specific research on organizations addressing KM education could be located.

Table 3 – Qualitative Approach Characteristics (Leedy and Ormrod, 2005)

Question	Qualitative Characteristics
What is the purpose of the research?	To describe and explain To explore and interpret To build theory
What is the nature of the research process?	Holistic Unknown variables Flexible guidelines Emergent methods Context-bound Personal view
What are the data like, and how are they collected?	Textual and/or image-based data Informative, small sample Loosely structured or nonstandardized observations and interviews
How are data analyzed to determine their meaning?	Search for themes and categories Acknowledgement that analysis is subjective and potentially biased Inductive reasoning
How are the findings communicated?	Words Narratives, individual quotes Personal voice, literary style

This research uses a multiple-case study approach to determine how the DoD is addressing KM education. Each service is designated as an individual case, with the Navy and Marine Corps combined as a single case. This decision was made because the Department of the Navy’s Chief Information Office (CIO) has, according to policy, jurisdiction over both the Navy and the Marine Corps. Because this research seeks to perform a comparative assessment of service approaches to KM education, Yin (2003) declares that a multiple-case design is more appropriate and robust, more easily illustrating complementary and contrasting KM education approaches.

Necessary Components of Case Study Research

Yin (2003) identifies five necessary components of case study research: 1) developing a research question; 2) detailing any propositions; 3) defining a unit of analysis; 4) performing data collection; and, 5) performing data analysis.

The first component of case study research design is accomplished with the establishment of the research question in Chapter 1, “How is the DoD addressing KM education?” The second component of case study research design is accomplished by developing investigative questions. These investigative questions direct attention to propositions that will be addressed by this research. These propositions are, namely:

Proposition 1: KM education is important to the DoD

Proposition 2: Each service has a different approach to KM education

Proposition 3: KM education goals, outcomes, and metrics aren't well developed

The research data used to answer IQ1 will support or refute the first proposition. Research data used to answer IQ2, IQ3, IQ4, and IQ7 will support or refute the second proposition. Research data used to answer IQ5 and IQ6 will support or refute the third proposition.

A unit of analysis helps to refine what the cases will be to research and accomplishes the third component of case study research design. To allow for general comparisons between cases, service-wide KM education programs are to be the unit of analysis. Yin (2003) observes that identifying a unit of analysis also determines the limits for data collection and analysis.

The fourth component, data collection, is accomplished by conducting interviews with members of the organizations responsible for service-wide KM implementation, collecting documents addressing KM education published by each service, and reviewing each service's web portals for other data. Yin (2003) declares that using convergent lines of inquiry from

multiple sources provides data triangulation that can be used to convincingly and accurately answer research and investigative questions. Interviews with the Air Force will be conducted with members of the Warfighter Integration and CIO's KM office and members of the Air Force Material Command's Center of Excellence for KM responsible for service-wide KM implementation. Interviews with the Army and the Navy will be conducted with members of each service's respective CIO's KM office responsible for service-wide implementation. KM education documents published by each service used in data collection will be described in Chapter 4. Finally, as each service's central "KM" portals, the Air Force Knowledge Now, Army Knowledge Online, and Navy Knowledge Online web portals will be used to gather data. All data collected during the research period (November 2006 – February 2007) will be entered into a case study database to document interview responses, and appropriate document and web portal content.

This study accomplishes the fifth component, data analysis, through supporting or refuting the propositions. In order to do this, Yin (2003) suggests pattern matching as an effective method to analyze a collection database and derive generalizations about the propositions. Thus, this method highlights where the services share similarities or diverge in KM education approaches, allowing one to draw conclusions about the data that can be verified with findings from theory.

Quality and Reliability of Case Study Research

It is essential for case study research to establish quality through validity and reliability of the research. Yin (2003) argues that multiple case study designs must establish construct validity, external validity, and reliability. Construct validity seeks to ensure that correct operational measures are employed to accurately research the concepts being studied. In order to

establish construct validity, this research only analyzes those documents addressing service-wide KM and KM education initiatives. In addition, this research only interviews those individuals responsible for service-wide KM and KM education initiatives. This research provided copies of interview questions in advance to allow potential participants to determine for themselves whether they were qualified to provide comments. Additionally, a chain of evidence supporting the formulation of the research and investigative questions was established in Chapter 2. External validity focuses on establishing the generalizability of a study's findings beyond the cases researched. While this is can effectively accomplished by replicating the findings on different cases, the analytical nature of this research's findings can only be replicated on other military organizations. Yin (2003) says that research is reliable if another investigator can use the same research procedures in repeating a case study on the same case, and arrive at the same findings. By reducing biases and minimizing error, Yin says research improves in reliability. This research documents the procedures of data collection and data analysis in Chapter 3 and findings in Chapters 4 and 5.

Research Limitations and Biases

Yin (2003) states that reducing and controlling for biases is crucial to the overall reliability and quality of case study research. This study admits bias on the part of the investigator as a member of the Air Force. By relating findings with a research committee throughout data collection and analysis, this bias was mitigated to the full extent possible. Another limitation of this research is the relative complexity and contemporary nature of KM and KM education. Many individuals looking to draw value from knowledge do not agree on the definition of KM, harbor different expectations of KM, and have varying levels of experience with KM. Interviewees were allowed to review findings for final input and additional

clarification. Admittedly, the investigator does not know of any other methods to mitigate this limitation.

Another limitation involves the number of cases within the DoD. The research question and unit of analysis dictate that there are only three possible cases; this number is not sufficiently large for literal replication of findings. However, this research's findings are generalizable to the extent to which they can be tied to KM and education evaluation theory. A final limitation of this study is the period of time in which it was conducted; the three-month period for data collection limits the richness of the findings.

IV. Analysis

This chapter includes all data collected in order to answer the investigative questions and overall research question. Sections corresponding with each investigative question, followed by data collected from each service, subdivide this chapter. Data collected in order to answer the investigative questions came from interviews with members of the organizations responsible for service-wide KM implementation, documents addressing KM education published by the DoD and each service, and other appropriate data from each service's web portal.

IQ1: What is the perceived importance of KM education?

The perceived importance of KM education was determined by two methods: content analysis of documents and interviews. While document searches provided an objective, unbiased method for collecting data that would answer this question, interviews provided an additional subjective, but rich source for data collection. Document searches were completed by using applicable websites (described below) and each service's web portal search engine to locate documents containing the phrases, "knowledge," "knowledge management," and "knowledge management education." These searches yielded many documents, including those specific to particular communities or interest groups. These community- and interest-specific documents were eliminated in order to focus on the unit of analysis: service-wide KM education programs. The title and author of each document was recorded in the collection database. Each person interviewed was also asked this investigative question and his or her response was also recorded in the collection database. As stated in the literature review, this investigative question is important because organizations are more likely to have successful education programs and devote resources to those education programs they deem to be important.

Air Force

In a 2004 memorandum to the Air Force Materiel Command (AFMC) Vice Commander, the Air Force CIO (SAF/XC) delegated responsibility for service-wide Air Force KM efforts to the AFMC Center of Excellence for Knowledge Management. The Center of Excellence accomplishes this task through its collaboration tool, Air Force Knowledge Now (AFKN). AFKN provides users with the resources to create and build individualized communities of practice (CoP). The requirement to educate and train users on the capabilities and potential of AFKN CoPs has grown with the tool's popularity and use. However, while AFKN personnel find KM education crucial to the collaboration tool's success, they characterized users' perceived importance of KM education as minimal. AFKN personnel related in interviews that the majority of users were only interested in learning how to use AFKN and were not interested in learning about KM principles.

SAF/XC personnel related in interviews that KM education is crucial to KM effectiveness, and that they are developing KM education to be added to basic training and professional school education curricula. As of this writing, such education does not currently exist. This data suggests that the KM education is important to those in the Air Force currently practicing KM, but is not yet deemed important by others outside that scope.

Army

The Army has established a service-wide KM effort it calls Army Knowledge Management (AKM). While AKM serves only as a guide for Army KM efforts, and not doctrine, the purpose of AKM is to develop a "network-centric, knowledge-based force." This KM effort was initiated in 2001 by the Secretary and Chief of Staff of the Army with implementation authority delegated to the directly-subordinate CIO/G-6 office. Additional

AKM Guidance Memorandums published by the Secretary and Chief of Staff provide continued guidance and direction for AKM efforts. AKM has five stated goals: 1) adopt governance and cultural changes to become a knowledge-based organization; 2) integrate KM and best business practices in Army processes; 3) manage the infostructure at the enterprise level; 4) scale Army Knowledge On-line (AKO) as the enterprise portal; and, 5) harness human capital for the knowledge organization. The Army's KM education efforts are led by the CIO/G-6's KM and Human Capital divisions. The KM division published an Army-wide implementation guide in 2003 with KM initiatives and completion deadlines required in order to fulfill each AKM goal. This implementation guide includes specific KM education initiatives that will be discussed in detail in a following section.

This data suggests a strongly perceived importance of KM education to the Army. This is chiefly manifest by two things: 1) delegating KM education responsibilities to the CIO/G-6 office which reports to the Secretary and Chief of Staff of the Army; and, 2) publishing a service-wide, authoritative document with specific KM education actions and deadlines.

Navy

In October 2005, the Department of the Navy (DON) CIO published a memorandum to communicate the Navy's KM strategy. This memorandum established a KM vision "to create, capture, share, and reuse knowledge to enable effective and agile decision-making, increase the efficiency of task accomplishment, and improve mission effectiveness." To realize this vision, a four-fold strategy was developed to: 1) broaden and expand Departmental awareness that KM concepts, when applied to the operational and business processes of any command, will enable significant improvements in mission accomplishment; 2) encourage commands to implement KM programs, structure, pilots, and methodologies as part of process improvement efforts; 3)

assist commands with KM experience to share their experiences, lessons learned, and results to foster collaboration, enable shortened learning cycles, and assist other efforts; and, 4) assist commands embarking on new implementations to build upon the experiences and resources of others. This memorandum further clarified seven focus areas in order to effectively implement this strategy. These focus areas include KM advocacy, training and education, culture change, CoPs, KM collaboration, KM tools, and KM integration with related initiatives. The memorandum concluded by directing commanders to use KM concepts and tools to improve business and warfighting effectiveness, share KM best practices and resources, and continue to champion KM as a critical enabler of force transformation.

This data suggests a strongly perceived importance of KM education to the Navy. This is chiefly manifest by two things: 1) delegating KM education responsibilities to the DON CIO office, which reports to the Chief of Naval Operations; and, 2) publishing a service-wide, authoritative document with a KM vision, strategy, focus areas, and specific KM education actions.

IQ2: What is the nature of the programs in place to educate for KM?

The nature of KM programs in place to educate for KM was determined through interviews with the service-level organizations (listed in Chapter 3) responsible for KM. These organizations provided information on KM education efforts and recommended KM education products to evaluate. While some services had well-developed KM education products for specific communities, these were not evaluated in order to focus on the correct unit of analysis. An example of this was the Air Force's well-developed financial management KM program. While many KM education products augment this program, they do not fit the criteria for

appropriate unit of analysis because they are not available on a service-wide basis and are community-specific.

The analysis of information pertaining to the nature of KM education programs revealed three major components. First, KM education was made available through numerous different methods (on-line, DVD, on-site, seminar, etc.). Second, KM education offerings were quite varied by their length of offering (self-paced, multi-day, academic quarter, etc.). And third, KM education offerings covered a wide range of focus topics. This investigative question is important in establishing the context of KM education products for analysis.

Air Force

AFMC Center of Excellence in-house experts tailor educational sessions for customers as requested. After educational sessions are finished, AFMC personnel help establish a CoP for this same customer. These educational sessions occur on-site when customers desire to know more about AFKN. These sessions range from 1-2 hour overviews with live demonstrations of the AFKN tool to 1-2 day strategic immersion events. Strategic immersion events include additional, in-depth instruction on concepts such as knowledge owners and the dynamics of how communities interact. To this point, this KM education has been customer-specific, but AFKN personnel related in interviews that they are attempting to standardize KM education sessions and materials.

Another KM education product is found in the IT E-Learning section of the Air Force Portal. The IT E-Learning products were endorsed by the Air Force Communications Agency (AFCA) and were developed by an independent contractor. While AFCA initiated development of these products for use by personnel in the Communications-Information career field, because they are available to all Air Force personnel these products meet the requirements for our unit of

analysis. Ten courses mention “knowledge management” in the course description and/or course objectives:

- Knowledge as a Strategy: Performance Improvement
- The Art of Knowledge Management
- Putting Knowledge To Work
- The Power of the Learning Organization
- Implementing and Evaluating Self-Directed Learning
- Knowledge as Capital
- Being a Knowledge Activist
- Managing Knowledge Workers
- Leadership and the Knowledge Worker
- The Path to Peace and Harmony

KM focus topics taken from the main objectives for these on-line, self-paced courses include:

- Knowledge Management for Competitive Advantage
- The New Era of Knowledge Management
- Empowering Knowledge Creation
- Creating Knowledge
- Overcoming Barriers to Knowledge Creation
- Locating and Capturing Knowledge
- About Knowledge Sharing
- Leveraging Knowledge to Success
- Human Knowledge as Capital
- Structural Knowledge as Capital
- Relationship Knowledge as Capital
- Knowledge Activists
- Becoming a Knowledge Activist
- An Environment for Knowledge Workers
- A Culture for Knowledge
- Managing Teams of Knowledge Workers
- Motivating Knowledge Workers
- Establishing a Knowledge Base

Additionally, the Air Force Institute of Technology offers an IMGT 680: Knowledge Management course to in-residence graduate students. Because this course is not available to all service members, it is not included as applicable data for this research effort. The nature of Air Force KM education programs includes AFKN collaboration tool training and on-line courses available through the Air Force Portal.

Army

The AKM implementation guide lists specific initiatives to be accomplished in order to achieve the Army's five stated AKM goals. These initiatives call for:

- Planning, recruitment, retention, education and development of the command, control, communications, computers, and information management (C4IM) workforce to meet the technical and managerial needs of transforming the Army into a network-centric, knowledge-based force.
- Institutionalizing knowledge sharing and knowledge management via the Army's infostructure.
- Transforming processes to embed knowledge management into Army operations.
- Developing in-house KM expertise within functional communities.
- Integrating KM concepts and best practices into Army processes to improve individual and organizational decision-making.

One method through which the Army fulfills these initiatives is through the Army Knowledge (AK) Leaders program. Each year the Army recruits top business and IT management college graduates for two years of intensive academic training, hands-on experience, and mentoring in IT management and leadership. A course on KM is part of the Army Knowledge Leaders program to provide participants with an understanding of KM and its use in the Army. Because this course is taught by a contractor and is privileged information, particulars on this KM course were not available for inclusion in this research.

The Army CIO/G-6 office conducts programs to educate and establish a baseline understanding among the Army Staff, functional communities, and the operational Army on KM. The CIO/G-6 office provides KM education sessions and products tailored to the Army Staff and those organizations requesting KM assistance. The CIO/G-6 office has subsequently created an instructional DVD by using the previously-mentioned course objectives in order to educate more members on KM. This "Foundations of Army Knowledge Management" DVD is divided into eight learning modules designed to build KM awareness. These modules focus on a general overview of KM, KM in the Army context, KM tools (i.e. portals, data repositories), KM

dimensions (technology and people), and CoPs. In addition to the DVD format, these training modules are available on the Army's distance learning website, accessed via the Army service-wide intranet portal, AKO.

The Army is also creating Battle Command Knowledge Cells staffed with Knowledge Management Officers (KMO) to facilitate KM within battle commands. To increase their effectiveness, the Army has a draft Standard Operation Procedures (SOP) document to assist KMOs in establishing and cultivating KM programs. This draft document includes instruction on implementing a KM program in a unit, worksheets to assist KMOs with knowledge assessments, additional KM resources, KMO lessons learned, fellow KMO contact information, and KM tool user guides. Army Field Manual Instruction 6-01.1 also provides many of these same resources and indicates that a training and education program for Battle Command Knowledge Cell personnel is being developed. This education will focus on both the art and the science of KM.

KM education in the Army derives from two directional thrusts: "push" from senior leaders, such as the CIO, Secretary, and the Chief of Staff, to educate Army members on the uses and benefits of KM in Army operations; and "pull" from organizations seeking educational course content on how to fuse KM with business processes.

Navy

KM in the Navy is focused on its two main postures: in-garrison and at sea. KM education for in-garrison applications is conducted primarily through DON CIO KM education sessions. DON CIO finds KM education as a critical component of the Navy's KM program and has absorbed all costs for the DON CIO KM education sessions. These multi-day training sessions are conducted by DON CIO personnel upon request and focus on creating "awareness

and understanding of the full spectrum of KM and how it can impact performance,” within the context of enterprise/commands, communities, and individuals.

KM education for the Navy’s at-sea posture is primarily designed to support carrier strike group Knowledge Officers (KO). Tactical Training Group Pacific (TTGP) conducts KM education sessions for KOs getting ready to go to sea but are also conducted for carrier strike group admirals and staffs. TTGP sessions were developed by in-house personnel to ensure KOs can effectively fulfill their duties and to ensure carrier strike group leadership understands and encourages KM in support of KOs. TTGP sessions focus on:

- Information Management
- Introduction to KM
- Knowledge Flows
- KM Practical Applications
- Joint Staff and KM
- KM examples in industry

Another at-sea KM education product is available through the Naval Postgraduate School (NPS). NPS KM courses include IS4210: Knowledge Superiority (KS) and its prerequisite, IS3210: Defense Knowledge and Information Management. Both courses are available to all Navy personnel on-line and are available during regular schooling periods without any face-to-face instructional sessions. Interactive learning modules and online discussions provide the foundation for instruction in these classes. Topics covered include:

- Understanding how knowledge is critical and unique
- Designing processes, organizations, and technologies around knowledge flows
- Critiquing knowledge-based processes and organizations

Navy personnel can access Navy Knowledge On-Line (NKO) continuing education units as a final at-sea KM education product. While KM education courses are mandatory for Information Professionals, they are available to all Navy personnel. The NKO continuing

educational unit course, “Knowledge Distribution, Knowledge Flow, and Organizational Performance” is an on-line, self-paced course. The course focuses on:

- Identifying benefits of KM in the Navy
- Understanding different kinds of knowledge and how they add value to an organization
- Understanding why knowledge flows in some organizations and clumps in others
- Taking steps to become a member of one’s CoP

Navy KM education products are designed around the service’s unique operating postures: in garrison and at sea. DON CIO KM education courses are available for in-garrison application and are taught by request. At-sea KM education products are available on-line through NKO and NPS; KOs receive additional KM education through TTGP sessions.

IQ3: Who has developed the KM education programs?

Data analysis shows that KM education development across the services stems from two types of arrangements. The first arrangement included outsourcing development to an independent contractor. The second arrangement included development through the collaboration of military, civilian, and “permanent” contract employees. Oftentimes, this collaboration included inputs from multiple organizations with a vested interest in KM within a service. This type of arrangement is identified as “in-house” development in the following descriptions. Analysis further reveals that those KM education products developed by “in-house” personnel focus on placing KM education within the context of the service. Participants can more easily identify with and learn from KM education products placed within the context of the service. Improved participant learning is important in achieving education program goals and expected outcomes, which is evidence of effective education programs.

Air Force

AFMC Center of Excellence personnel developed all AFKN collaboration tool education materials. Under AFCA direction, an independent contractor developed and fielded KM education materials accessible through the Air Force portal.

Army

CIO/G-6 personnel produced and created the “Foundations of Army Knowledge Management” DVD. CIO/G-6 personnel also created the AK Leaders material on KM. These same personnel also developed the CIO/G-6 KM education sessions for requesting organizations. Battle Command Knowledge System (BCKS) personnel are in the midst of creating Battle Command Knowledge Cell education materials.

Navy

DON CIO personnel created the KM education sessions for requesting organizations. TTGP, NPS, and Network Warfare Command (NETWARCOM) personnel worked collaboratively to create TTGP and NKO continuing educational unit course material. NPS in-house faculty members created the KM education material available through NPS.

IQ4: What do the curricula consist of?

As stated in the literature review, effective education programs use materials that help achieve the education program’s goals. This investigative question is important in ascertaining what KM education products focus on and can be used to identify gaps in KM education as it relates to goal achievement, as outlined in the next section. Data analysis shows that Air Force KM education curricula focus on AFKN collaboration tool use and fundamentals of KM. Army KM education curricula focus on KM fundamentals within the context of the Army, and operationalizing KM throughout the service. Navy KM education curricula focus on KM

fundamentals within the context of the Navy, improving KM programs, and operationalizing KM throughout the service.

Air Force

AFKN KM education focuses on AFKN collaboration tool functionality and use. Topics covered include: searching, AFKN on-line help, Air Force Deskbook, knowledge areas and CoPs, CoP types, AFKN resources and tools, and CoP administration.

KM education available through the Air Force Portal includes the previously mentioned focus topics. Specific curricular components of these focus topics include:

- Knowledge Management for Competitive Advantage
 - Relationship between KM and performance improvement
 - Components, processes, and critical success factors for KM systems
- The New Era of Knowledge Management
 - KM benefits
 - Difference between data, information, and knowledge
- Empowering Knowledge Creation
 - Benefits of, and principles for supporting knowledge creation
 - Criteria for an effective knowledge vision
- Creating Knowledge
 - Value of knowledge creation
 - Internal sources of knowledge
 - Obtaining external knowledge
- Overcoming Barriers to Knowledge Creation
 - Identifying and overcoming barriers to knowledge creation
- Locating and Capturing Knowledge
 - Locating, collecting, and capturing knowledge
 - Transforming tacit knowledge to explicit knowledge
 - Maintaining knowledge repositories
- About Knowledge Sharing
 - Benefits, methods, and criteria to share knowledge
 - Overcoming common barriers to knowledge sharing
- Leveraging Knowledge to Success
 - Benefits of leveraging knowledge
 - Return on investing in knowledge management
- Human Knowledge as Capital
 - Benefits of understanding human knowledge capital
 - Human knowledge capital and organizational value
 - VITALS (indicators for measuring human knowledge capital)
 - Effectively managing human knowledge capital

- Structural Knowledge as Capital
 - Benefits of leveraging the structural knowledge capital
 - Measuring structural knowledge capital
 - Managing the human side of structural knowledge capital
- Relationship Knowledge as Capital
 - Benefits of understanding the relationship knowledge capital
 - Measuring relationship knowledge capital.
 - Managing relationship knowledge capital
- Knowledge Activists
 - Benefits of being a knowledge activist
 - Reasons, characteristics, and roles of knowledge activists
 - Techniques for effective communication
- An Environment for Knowledge Workers
 - Workplace attributes and methods to create a supportive environment for knowledge workers
- A Culture for Knowledge
 - Benefits of creating a culture that supports knowledge workers
 - Methods for shifting the culture
 - Steps of empowering knowledge workers to make decisions
- Managing Teams of Knowledge Workers
 - Benefits of effectively managing teams.
 - Behaviors and parts of the TRUE approach for leading teams to success
- Motivating Knowledge Workers
 - Encouraging additional learning in knowledge workers
 - Using and rewarding the expertise of knowledge workers
- Establishing a Knowledge Base
 - Benefits of leadership in creating ways to share knowledge
 - Methods of introducing KM into an organization
 - Types of knowledge bases, and how to facilitate them

Army

They Army Knowledge Leaders KM education curriculum was not available to be included in this research. KM education for Battle Command Knowledge Cells is under development, at the time of this writing, and unavailable for inclusion in this research.

The draft SOP document includes instruction on:

- KM Fundamentals
 - KM vs. information superiority
 - Understanding KM
- Necessity for KM
 - Purpose and benefits of KM
 - Identifying valuable knowledge

- KM in the context of modern technology
- KMO Duties
 - Program management
 - Knowledge Development
 - Developing and maintaining a KM portal
 - CoP facilitation and KM tool evaluation
 - Spokesman
- Implementing a KM Program
 - Obtaining leadership buy-in
 - Establishing a unit knowledge portal
 - Performing a knowledge audit
 - Jumpstarting a KM program
 - Best practices
 - Managing change, culture, and rewards

The “Foundations of Army Knowledge Management” DVD curriculum includes:

- What is KM?
 - Three different types of knowledge
 - Key components of KM
 - Chief Knowledge Officer (CKO) Roles
 - Major parts of the organizational knowledge problem
- What is AKM?
 - AKM strategic goals and current activities
- KM Toolkit
 - Two sets of KM tools and techniques
- The People Dimension
 - Structures that must be in place and operational before KM can work
 - Characteristics of an effective leader in the KM context
 - Applying systems theory to decision-making
- Communities of Practice
 - Key characteristics of a CoP
 - Role of a CoP in today’s Army
 - How BCKS improves the Army’s decision dominance
- The Technology Dimension
 - Explanation of the term portal
 - Structured and unstructured data
 - Data warehouses and data mining
- The Future of KM
 - Organizational characteristics of the Army of the future
 - Intelligent Complex Adaptive System (ICAS) and future Army success
 - Applying KM to support decision-making

The DON CIO education session, for in-garrison applications, curriculum consists of:

- KM History and Overview
- Strategic Planning and KM
- Performance Metrics and KM
- Commitment and Communications
- Organizational Structures and KM
- Process and KM
- Knowledge Audit
- Peer Assist
- Action Review
- Retrospect
- Community of Practice
- KM and You
- Learning Tools
- Books on KM

The TTGP course curriculum includes the following items:

- Distinguishing between information management (IM) and KM, and why they are important to the Navy
- Types of knowledge (tacit, explicit)
- Organizational knowledge
- Knowledge flow principles
- Navy KM definition, governance, and strategy
- Domains of KM (people, culture, technology, processes)
- Command, Control, Computers, Communications, and Information in Strike Groups
- Strike Group knowledge manager roles, skills, and competencies
- KM obstacles
- Initiating culture change (do's and don'ts)
- Measuring KM return on investment
- KM education
- Organizational self-assessment
- Types of KM strategies (tactical, mission-centric, vision-centric)
- Creating a KM strategy (purpose, definition, guidance, methodology)
- Defining battle rhythm
- Information mapping (information requirements, information transmit/receive processes, information roles, ensuring information supports battle rhythm, overlapping information and business processes)
- KM working groups (stakeholders, process users, cross-functional solutions)
- KM pilot projects

- Knowledge capture (Spyder interviews)
- Learning stages (before, during, after)
- Differences between CoPs and Communities of Interest
- CoP objectives, roles, and responsibilities
- Creating and sustaining CoPs
- CoP performance metrics
- Industry KM examples

NPS KM education course curricula include:

- Knowledge power
- Knowledge uniqueness
- Knowledge flow
- Knowledge technology
- Knowledge and learning
- Knowledge-flow evaluation
- KM program evaluation
- Practical evaluation of business, government, and non-profit organizations' KM programs

The NKO continuing educational unit course curriculum includes:

- KM terms and definitions
 - Differences between knowledge, information, and data
 - Technology as a tool to enable KM
 - Differences between KM and information management
 - Tacit and explicit knowledge
 - Transferring tacit knowledge
 - Transferring explicit knowledge
 - Obstacles to knowledge flows in organizations
 - Types of knowledge capital (intellectual, social, human)
 - Communities of Practice
- Communities of Practice
 - Definition
 - NKO as a tool for CoPs
 - Importance of support for community-level collaboration
 - Knowledge visibility, reuse, and reciprocation
 - Community learning and collaboration to keep pace with change
 - CoP roles
- Organizational Knowledge
 - Organization's intellectual capital (human, corporate, social)
 - Human intellectual capital
 - Corporate intellectual capital
 - Social intellectual capital
 - Social intellectual capital as the foundation for enterprise knowledge

- Stages of organizational learning (before, during, after)
- Input KM influencers (processes, content, technology, policies)
- Output KM influencers (culture, strategy, measure progress)
- Leveraging KM for competitive advantage
- KM in the Navy
 - Examples of KM in action
 - Getting involved in KM in your organization

The on-line course also includes anecdotes and advice from individuals that were able to successfully apply KM to exercises and operations.

IQ5: What are the goals and expected outcomes of KM education?

KM education products had widely ranging goals and expected outcomes. Data analysis revealed that CIO-level KM education products appear to have the goal of “creating general KM awareness.” Analysis also revealed that KM education products with more specific applications (i.e. training carrier strike group KOs) subsequently have outcomes that are more specific. This investigative question is important because, as stated in the literature review, effective education programs typically are guided by overall education program goals.

Air Force

The overall goal of AFKN educational sessions provided for requesting organizations is not only to provide training on AFKN, but also to demonstrate that KM success is tempered by time and resource commitment. AFKN education session instructors emphasize and demonstrate to AFKN users that tool effectiveness increases proportionally with the amount of time and resources dedicated to operations.

The goals of the KM education products available through the Air Force Portal are to: 1) introduce a new focus on performance improvement based on knowledge as the competitive advantage in the 21st century; 2) develop KM awareness by introducing how knowledge is created and how knowledge creation is stymied; 3) initiate knowledge use, leverage, and

application within organizations; 4) measure organizational knowledge capital; 5) actively support KM within organizations; and, 5) create the right culture and opportunities for knowledge workers.

Army

The Army's KM education goals and outcomes listed in the AKM implementation guide include: 1) the planning, recruitment, retention, education and development of the C4IM workforce to meet the technical and managerial needs of transforming the Army into a network-centric, knowledge-based force; 2) institutionalizing knowledge sharing and KM; 3) transforming processes to embed KM into operations; 4) develop in-house KM expertise in functional communities; and, 5) integrate KM concepts and best practices into Army processes to improve individual and organizational decision-making.

The goals and expectations of the "Foundations of Army Knowledge Management" DVD and on-line modules are to have each viewer:

- Be able to define the term KM
- Be able to identify components of Army's knowledge-based goal
- Have been introduced to the idea that every member of the Army community has a role in using KM

Navy

The desired outcomes of the DON CIO KM education sessions are to help each attendee to:

- Understand KM
- Understand the differences between enterprise/command, community, and individual KM
- Know which learning tools apply to learning before, learning during, and learning after
- Know where to locate supporting KM references and resources
- Possess the ability to apply KM to a real world problem

TTGP sessions were developed by in-house personnel to ensure that KOs can effectively fulfill their duties, and to that ensure carrier strike group leadership understands and encourages KM in support of KOs.

The desired outcomes for the NPS courses are:

- Understand how knowing relates knowledge to action, in the organizational environment, with the ability to conceptualize KM/KS in terms of purposeful activities such as decisions, behaviors, and work
- Comprehend the critical elements of KM/KS, in the context of knowledge-flow theory, at the level of a knowledgeable professional
- Analyze knowledge-work activities, in terms of knowledge-flow effectiveness, to identify the major strengths and weaknesses of an organization's KM/KS program
- Assess the effectiveness of an organization's KM/KS program, in a critical yet constructive manner, with the competency of a KM/KS professional
- Formulate a KM/KS program enhancement plan, guided by theory and experience, with the competency of a KM/KS professional

IQ6: How are metrics used to evaluate KM education outcomes?

Data analysis revealed that KM education metrics attempt to measure two different things: how well participants learn the product material and how effective participants are in applying the KM education product material. While participant attendance (number of downloads, number of hits, number of DVD copies made, etc.) is noted below, it does not measure either participant learning or KM education effectiveness. This investigative question is important as the literature review established that effective education programs seek to measure whether and how they meet education program goals.

Air Force

AFMC Center of Excellence personnel use pre- and post-tests to measure participant learning in their AFKN training sessions. AFMC personnel typically establish CoPs for AFKN training session participants and measure CoP contribution and use over time. One cannot conclude that CoP use measures training session effectiveness because too many other factors

affect CoP use. Examples of external factors that may affect CoP use include the tool's ease of use, work demands that prevent users from CoP contribution, and accessibility issues (i.e. network outages). Thus, AFKN training session effectiveness cannot be measured through CoP use statistics. KM education products available through the Air Force Portal do not include any form of measurement to evaluate participant learning or effectiveness.

Army

The Army tracks participant attendance for the “Foundations of Army Knowledge Management” DVD and on-line modules, and CIO/G-6 classes.

Navy

The Navy tracks participant attendance for the DON CIO educational sessions. TTGP uses end-of-course surveys to evaluate education material quality and participant learning. In addition, TTGP measures education effectiveness through interviews with carrier strike group leadership and KOs after they return from deployments. These interviews help to ascertain how effective KOs were in their duties, and to what level carrier strike group leadership encouraged KM and the KOs. These interviews are conducted by TTGP personnel of equal rank on an individual basis. The NPS courses use end of course student surveys and tests to determine participant learning. NKO continuing educational units require individuals to take a pre-test on the material to be covered before they are able to review the course material. At the conclusion of the course material, individuals take a post-test in order to measure participant learning.

IQ7: What issues have arisen while trying to educate members about KM?

Rich data collection on issues encountered while trying to educate members about KM occurred during interviews with organizations responsible for service-wide KM. General issues included: leadership support, funding availability, and individual willingness to participate.

Funding was more scarce for some organizations than for others. This investigative question is important in putting KM education resources in context for analysis.

Air Force

Senior leadership support for Air Force KM and AFKN remains to be a challenge. Interviews attribute this challenge to a general lack of KM awareness among senior leaders with many leaders mistaking KM for information management. This lack of awareness and support has translated into difficulty in procuring resources for continued, and expanded, KM education development. Center of Excellence personnel have had to field AFKN without the “bells and whistles” that other collaboration tools have. These same personnel have found, in some instances, that AFKN’s lack of extra features serves as a barrier for potential users. For instance, potential users assume that AFKN does not have the same capabilities as other commercial collaboration tools they are familiar with. However, AFKN training sessions frequently help this kind of user to understand AFKN’s unique capabilities and encourage tool use. An example of this is found with the AFKN Combat Comptroller CoP. After two educational sessions with stakeholders from around the world, AFKN and finance personnel leveraged strong finance community leadership support and funding commitments to create a Combat Comptroller CoP that grew to 750 members in one year. Used to support deployed warfighters around the world, this CoP includes deployment information, business resources, deployed location photos and stories, and a comptroller wisdom exchange.

Interviews also identified the inclusion of KM education into professional military education (PME) course as an issue for expanding KM education throughout the service. Because PME courses are fixed in length, adding KM education to PME courses would require

the deletion of existing material. SAF/XC personnel are attempting to justify the benefits of adding KM education to PME courses.

Army

Army culture has been supportive of KM and KM education. Procuring funding to create and maintain KM education products with so many other Army demands has been and will continue to be a challenge.

Navy

One of the DON CIO's top goals in providing KM education to service members has been incorporating KM education into PME courses. Like the Air Force, PME courses are fixed in length and adding KM education material requires deleting other material. DON CIO personnel are working to justify the benefits of adding KM education to PME courses and hope to make this addition in the next few years.

The greatest obstacles to TTGP KM education are funding support and KO assignment rotations. TTGP is working with career-field managers to channel KOs through TTGP KM educational sessions before going to sea. TTGP personnel related in interviews that providing KM education to KOs before going to sea has contributed to improved KO effectiveness in two specific instances. First, a number of Fleets have made KOs report directly to the Fleet Chief of Staff after witnessing effective KOs and KM in action. This organization allows KOs to facilitate KM across different cultures and functions within these Fleets. As a second example, during the Blue Flag 05-01/JTFEX-02 exercise a recent participant in a TTGP KM education session used knowledge and information mapping to improve commanders' decision-making abilities. This knowledge and information mapping was designated as a SOP by exercise leaders.

Summary

The different services in the DoD place varying degrees of importance upon KM education. They are also pursuing somewhat different KM education means, curricula, and expected outcomes and goals. Current KM education metrics are focused on measuring participant attendance but some KM education products attempt to measure participant learning. The Navy is attempting to measure KM education program effectiveness. All services' KM education programs struggle to receive adequate funding but there are a few examples of KM education success. These findings are summarized in Table 4.

Table 4 – DoD KM Education Findings

	Air Force	Army	Navy
Perceived Importance	Perceived important only to KM practitioners	Strongly perceived importance	Strongly perceived importance
Nature of Programs	AFKN collaboration tool training IT E-Learning courses	Army Knowledge Leaders “Foundations” DVD/on-line CIO/G-6 sessions KM Officer Standard Operating Procedures document	CIO sessions Tactical Training Group Pacific sessions Naval Postgraduate School courses Navy Knowledge On-line units
Program Development	In-house Contractor	In-house	In-house
Curricula	AFKN collaboration tool use KM fundamentals	KM fundamentals KM dimensions Necessity for KM Communities of Practice KM Officer duties, effectiveness KM in Army context	KM fundamentals KM domains KM metrics Communities of Practice Knowledge Officer duties, effectiveness KM in Navy context
Goals and Outcomes	Increased AFKN collaboration tool use KM awareness	Knowledge-based Institutionalize KM Develop KM expertise Effective KM Officers	Understand KM Apply KM Improve KM effectiveness Effective Knowledge Officers
Metrics	Participant learning	Participant attendance	Participant attendance Participant learning Education effectiveness
Education Issues	Senior leadership support Adding KM to Professional Military Education courses Funding	Funding	Adding KM to Professional Military Education courses Assignment rotations Funding

V. Discussion, Conclusions, and Recommendations

In this chapter, conclusions, recommendations, and suggestions for future research are discussed. Data collection and analysis put forth in Chapter 4, which pertains to the research propositions discussed in Chapter 3, provides the foundation for all conclusions.

Recommendations are included for each service on ways to improve their KM education efforts.

Suggestions for future research focus on improving, expanding, and institutionalizing KM education within the DoD.

Discussion and Conclusions

The DoD services place varying degrees of importance on, and undertake different approaches to, KM education. The Army and Navy have demonstrated the greatest commitment from senior management levels for KM education, and subsequently appear to have more mature efforts. This appears to be a reflection on efforts made through CIO education sessions to educate senior leaders on the importance and benefits of KM. Because service senior leaders understand the importance of KM and KM education, senior leaders have empowered each service's CIO to provide KM education oversight. Each service CIO reports directly to his service senior leaders, providing an effective feedback and accountability mechanism for service-wide KM education efforts.

The Army and Navy CIOs have established KM education goals and program direction in service-wide directives, allowing the CIOs to "push" KM and KM education throughout their service. The Army has provided service-wide KM education goals within the AKM strategy, while the Navy has allowed its individual KM education programs to establish their own goals. Overarching service-wide goals backed by strong senior leadership support appear to have

resulted in greater resource commitment to KM education. For instance, to facilitate “pushing” KM education, the Army and Navy have fielded KM education materials through all available media: on-line, DVD, in-person education sessions, and “how-to guides.” These education products focus on a number of different areas: KM processes, KM domains/dimensions, CoPs, and applying KM to warfighting. The broad range of Army and Navy KM education focus areas allow the services provide KM education to personnel with varying degrees of understanding and ability, thereby increasing the total number of personnel that are educated about KM.

The Air Force appears to have undertaken a “grassroots” approach to KM education. Air Force personnel can “pull” KM education from on-line KM education products and AFKN tool training sessions. This “grassroots” approach has made KM education important to those attempting to initiate KM within their organizations. Those personnel could be classified as KM practitioners in the Air Force. Appropriately, Air Force KM education products appear to focus on aspects important to practitioners: KM fundamentals and AFKN tool use. This approach detracts from the ability of KM education products to educate as many Air Force members as possible.

Because the Army’s KM education goals apply to the entire service, curricula for the numerous Army KM education products can effectively be employed together to meet those stated goals. The Navy has created different KM education products to meet its KM strategy and vision, but have left KM education goals to those specific products. Curricula for those products appear to address adequately goal achievement. AFKN training session curricula for the Air Force appear to address appropriately the goal of teaching AFKN collaboration tool use. KM education products available through the Air Force Portal do not appear to have any overarching reason for their existence. Air Force Portal KM education products cannot be tied to any

organizational goals and therefore do not necessarily assist in promoting KM throughout the service.

Measuring KM educational outcomes appears to be a difficult challenge for the services. Measurement is currently focused on participant attendance and learning. The Air Force and Navy measure participant learning from KM education products through pre- and post-test evaluations and student surveys. The Army currently measures only participant attendance. The Navy is the only service attempting to measure how participants apply KM education principles by conducting interviews with TTGP KM education session participants and the participants' coworkers. These interviews are conducted after participants complete at-sea rotations in order to determine the degree to which TTGP session participants successfully apply KM education session principles.

A unique KM education product the Army is pursuing involves educating future civilian leaders about KM. The Army includes KM education as a part of their AK Leaders program to ensure that civilian leaders are educated about KM from the very beginning of their careers. The Army may be able to create entire KM-savvy generations of civilian leaders with this effort.

This research's evidence seems to support the first research proposition that KM education is important to the DoD to varying degrees across the services. As previously discussed, the Army and Navy appear to have strong leadership support for KM education. This leadership support has helped the Army and Navy to "push" KM education to service personnel through a number of different products. Additionally, the Army and the Navy have provided service-wide guidance and oversight for KM education. The Air Force appears to place a lesser degree of importance upon KM education as indicated by its "grassroots" approach to KM

education. This same evidence also seems to support the second research proposition that each service is pursuing a different approach to KM education.

Research evidence refutes parts of the third research proposition that KM education goals and outcomes aren't well developed. Both the Army and the Navy have specific, well-defined goals and outcomes for service-wide KM education efforts. All three services have specific, well-defined goals and outcomes for the specific KM education products. Research evidence supports the remaining part of the third research proposition that KM education metrics aren't well developed. The Army currently measures only participant attendance. The Navy and the Air Force both measure participant learning, but the Navy is the only service attempting to measure whether or not education participants are able to apply KM education principles in their work environment.

Recommendations

The first recommendation from this research is for the DoD services to collaborate on KM education development. Establishing dialogue between personnel developing and instructing in KM education can serve to improve overall education quality and effectiveness. While placing KM education within the context of each service is important to participants, KM education throughout the DoD is similar as it enables improved warfighting.

The variation in perceived importance of KM education throughout the DoD seems to be a reflection upon senior leadership support. The Army and Navy have a more regimented, centralized command structure that lends itself to standardization and compliance that spans communities and cultures. Senior leaders have a greater chance of implementing directives in a centralized command environment such as this due to the environment's inherent oversight and governance capabilities. For example, both the Army and Navy have taken steps to maximize

the inherent oversight and governance of centralized command by placing knowledge managers directly under the jurisdiction of warfighting commanders. This allows knowledge managers to more readily promote KM across the warfighting commander's many supporting functions. Research would indicate that stronger leadership support for KM education would increase the perceived importance of KM education to the Air Force.

It is recommended that the Air Force's SAF/XC organization undertake educating senior leaders about KM. The Army's CIO/G-6 and DON CIO's education sessions provide a valuable template for such a KM education product. As Air Force senior leaders begin to understand more about KM, it will be easier to develop a service-wide KM vision and strategy to guide future KM and KM education efforts. This research has demonstrated that service-wide oversight and governance of KM and KM education results in more mature KM programs.

It is important for each of the services to ensure that their KM education products are credible. While a government KM education certification program does not exist, an alternative would be to document each service's KM education products with the Federal CIO Council. The Federal CIO Council created the KM Working Group and Education, Learning, and Development special interest group to explore KM education issues within the U.S. government and industry. The Education, Learning, and Development special interest group maintains a directory of KM education courses offered by government agencies. The DoD should provide additional credibility to their KM education products by working to have their products included in the Education, Learning, and Development special interest group's directory.

KM education programs all suffer from a lack of financial resource availability, much of which stems from an inability to quantify its benefits to the service. All the services identified funding as a major issue in trying to educate members about KM. KM education efforts can

more readily be supported if KM education outcomes can be demonstrated to key stakeholders. KM education outcomes focusing on KM education effectiveness, and not participant learning, should be related to stakeholders. Evaluating how KM education participants change their behaviors and attitudes about KM is an appropriate measurement of KM education effectiveness. Measuring these attitude and behavioral changes over time provides evidence for KM education program evolution and expansion. It is recommended that the services conduct KM CoP surveys/interviews, stakeholder surveys/interviews, regular surveys/interviews of designated knowledge managers, and case studies of specific KM actions to evaluate KM education effectiveness. The addition of questions to ascertain the cultural acceptance of knowledge sharing and KM to service climate assessments can also provide evidence of KM education effectiveness. The results of these evaluations should be reported to key stakeholders and in regular general/flag officer conferences.

Finally, an additional recommendation for each service is to take steps to develop future civilian leadership that is well-versed in KM benefits and principles. The Army is working toward this through their AK Leaders program and the other services can model their programs after this approach.

Recommendations to improve how the DoD is addressing KM education focus on leadership support, KM education credibility, measuring KM education effectiveness, and educating civilian leaders. This research indicated that addressing these aspects of KM education programs can increase overall chances of KM education success.

Suggestions for Further Study

There is a fundamental lack of research on the importance of KM education to KM effectiveness and successful KM program implementation. Further case studies and empirical

work can help fill this gap in research. More organizations may be available for case studies by adjusting the unit of analysis, and this would also allow replication of the study's findings.

The unit of analysis for this study precluded the investigation of how multi-service organizations, such as Combatant Commands and U.S. Joint Forces Command, are addressing KM education. Such research could provide valuable input on how the DoD is addressing KM education within the operational environment.

The DoD cooperates with a number of other governmental agencies in order to conduct many of its missions (i.e. Department of Homeland Security, Drug Enforcement Agency). Determining how these other agencies address KM education could be helpful to KM practitioners in the DoD and industry as well.

Chapter Overview

In this chapter, conclusions from data collection and analysis were used to support and/or refute the research propositions put forth in Chapter 3. Research indicated that the DoD values KM education to varying degrees and approaches KM differently amongst the services. It was concluded that while KM education goals and outcomes were generally well-developed the services struggle with measuring the effectiveness of KM education efforts. Recommendations for improving overall DoD KM educational efforts include: 1) creating a "top-down" approach to KM education in the Air Force; 2) adding DoD KM education courses to the Federal CIO Council's KM Education directory; 3) focus on measuring KM education effectiveness instead of participant learning; and, 4) developing future civilian leaders well versed in KM benefits and principles. Finally, it was suggested that future research be conducted to: 1) provide additional case studies about organizations with KM education programs; 2) determine how the DoD

addresses KM education in operational environments; and, 3) investigate how other governmental agencies address KM education.

Appendix A: Definition of Acronyms

AFCA – Air Force Communications Agency

AFKN – Air Force Knowledge Now

AFMC – Air Force Materiel Command

AK – Army Knowledge

AKM – Army Knowledge Management

AKO – Army Knowledge On-Line

BCKS – Battle Command Knowledge System

CoP – Community of Practice

CIO – Chief Information Officer

CKO – Chief Knowledge Officer

C4IM – Command, Control, Computers, Communications, and Information Management

DoD – Department of Defense

DON – Department of the Navy

ICAS – Intelligent Complex Adaptive System

KM – Knowledge Management

KMO – Knowledge Management Officer

KO – Knowledge Officer

KS – Knowledge Superiority

NETWARCOM – Network Warfare Command

NKO – Navy Knowledge On-Line

NPS – Naval Postgraduate School

PME – Professional Military Education

QDR – Quadrennial Defense Review

SAF/XC – Warfighter Integration and Chief Information Officer

SOP – Standard Operating Procedure

TTGP – Tactical Training Group Pacific

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14. ABSTRACT Knowledge is a critical resource for organizations today, especially to the DoD. When organizations understand what knowledge is, they can begin to draw value from it. Drawing value from knowledge is best accomplished through the processes of knowledge management: knowledge creation, knowledge storage and retrieval, knowledge transfer, and knowledge application (Alavi and Leidner, 2001). Organizations can create an environment in which these processes flourish by ensuring the organization has the elements of a supportive leadership, structure to control and optimize knowledge sharing, technology to facilitate the KM processes, and a commitment to maximize knowledge sharing and continuously improve (Stankosky et al, 1999). KM education is the means by which organizations can successfully develop an understanding of KM, and those organizational elements required to implement and institutionalize KM. Statistical evidence shows that those organizations that do not adequately address KM education are more likely to fail with their KM systems (Koenig, 2004). Organizations desiring to capitalize on knowledge should then ensure that their KM education efforts are effective by establishing education goals, developing a curriculum to meet these goals, and continuously evaluating goal attainment. This case study research documents how the DoD is addressing knowledge management education.					
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