LEADERSHIP AND ADOPTION OF INSTRUCTIONAL TECHNOLOGY IN A MILITARY MEDICAL LEARNING ENVIRONMENT: A CASE STUDY

Lorenzo Tarpley Jr

Dissertation submitted to the faculty of the

Virginia Polytechnic Institute and State University

In partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

In

Education Leadership and Policy Studies

APPROVED:

John F. Eller
Marcie Boucouvalas
Theodore B. Creighton
William J. Glenn
Walter D. Mallory

April 21, 2010
Falls Church, Virginia

Key Words: Instructional Technology, Technology Adoption, Military Medical Learning Environment

Copyright © Lorenzo Tarpley Jr

LEADERSHIP AND ADOPTION OF INSTRUCTIONAL TECHNOLOGY IN A MILITARY MEDICAL LEARNING ENVIRONMENT: A CASE STUDY

Lorenzo Tarpley Jr

ABSTRACT

The leadership traits necessary in today's military medicine learning environment involve recognition of the rapid changes in technology, and possession of the ability to ensure continuous transformation and adaptability to that change. Understanding the culture of military medicine is an essential leadership capability, coupled with effective communication and visionary skills (Chambers, 1991).

Medical organizations that adopt new technologies in their training can expect better productivity and medical readiness (von Lubitz, Beier, Freer, Levine, Pletcher, Treloar, Wilkerson, & Wolf, 2001). United States medical school programs have recognized the need to introduce new technologies to allow clinicians to stay competent and reduce lethal medical mishaps (Elwyn & Lewis, 1998). The purpose of this study is to examine the adoption of instructional technology by faculty members at a military medical education program (Interservice Physician Assistant Program – IPAP). Within the case study, factors that facilitated or inhibited the adoption of instructional technology were examined. Additionally, IPAP program leadership behaviors were examined to describe its association with faculty member's adoption of instructional technology. Multiple methods were used to gather data including interviews, observations, and document analysis. This research used the grounded theory qualitative method approach to develop a theory deductively from the data. Fifteen faculty members participated in this study, 12 faculty members and three program leaders.

The findings suggest that significant efforts and positive attitudes toward the use of instructional technology existed among faculty members. However, the process of instructional technology integration at this military medical training facility faced impediments that affected its adoption rate by faculty members. The impediments included unreliable infrastructure, lack of training and technical support of new technologies, time commitment constraints that hindered training accessibility, compatibility with existing instructional technologies, complexity of the technology, and inadequate technical support.

The data analysis was based on Rogers' theory of diffusion and adopter categories (relative advantage, compatibility, complexity, trialability, and observability). The results of this study indicated that Roger's five variables of adoption of innovations were not effectively met. Moreover, the results identified specific issues from these categories that either influenced or inhibited the adoption rate of technology innovation at this training facility; such as organization factors, personal motivation, and social factors. The following recommendations were made: (1) emphasis on conducting faculty training and professional development on instructional technologies, (2) extending the physician assistant program curricula to accommodate built-in staff development training times, (3) encourage peer-to-peer mentorship training by supporting instructors with limited instructional technology experience, (4) develop a technology personnel qualification standards (PQS) check-in process for new faculty members, (5) provide sufficient infrastructure and technical support to meet the demands of an expanding technology-based curriculum, (6) an establishment of dialogue between organizations responsible for coordinating infrastructure, technical support, and training, and (7) provide competent technicians that are trained to troubleshoot all aspects of technology support.

ACKNOWLEDGEMENTS

This has been a long process that I could not have completed without the encouragement and support of my family members as well as my dissertation chair, Dr. John F. Eller. His influence over my doctoral studies cannot be underestimated. The contributions of my other committee members have been priceless. Despite demanding schedules, Dr. Boucouvalas, Dr. Glenn, and Dr. Creighton always provided excellent counsel on the direction of my studies. I would like to acknowledge Dr. Mallory who has provided me with invaluable insights on research methods. I also extend my gratitude to the rest of the faculty of Virginia Tech Graduate School located in both Blacksburg and Falls Church, Virginia.

I gratefully acknowledge the financial support of the United States Navy, and Mrs. Patricia Edwards and Commander Patricia Miller of the Navy Medicine Manpower, Personnel, Training and Education Command, Bethesda, Maryland. Additional thanks to the faculty and staff of the Interservice Physician Assistant Program, Academy of Health Science, Army Medical Department Center, Fort Sam Houston, Texas.

DEDICATION

To my dear wife, Rosie Tarpley for her love I am thankful everyday for her enduring patience in me during this involved process. Her untiring belief in me and us provides me strength every day. I could not have reached this academic milestone without the support of her and my children Danielle, Roderick, Lauren, and Rochelle. To my parents, Myrtis Tarpley and Lorenzo Tarpley Sr, although no longer on this earth, their guidance and support in my early years has guided me throughout life and enabled me to achieve my academic dream.

Praise God!

TABLE OF CONTENTS

Page

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

LIST OF TABLES

LIST OF FIGURES

Page

Figures

CHAPTER 1

Personnel placed in leadership positions must be knowledgeable of the positive and negative aspects of technology, and tolerate the uncertainty that is inherent in incorporating technology into a medical training program. Kearsley and Lynch (1994) argued, "Leadership in the domain of educational technology is different in various ways from leadership in general" (p. 5). Kearsley and Lynch both agree that leadership skills involved with instructional technology should be identified so particular skill-sets could be integrated into educational training programs.

Technology enhanced learning environments have become an essential component in medical education throughout the United States. As early as the late 1970s, the inclusion of technology into lesson plans had been considered the trend to modernize education and training from the traditional method of face-to-face instruction (Filipczak, 1997). Military medical training programs leaders and faculty members must be knowledgeable about and keep up with the latest technological developments to make informed choices to improve patient care (Guest, 1999). To achieve this goal, program leaders must incorporate current and new educational technologies into their training programs. Osborne, Costello, Datta, and Shattuck (2004) point out that program leaders must create an environment that promotes the adoption of instructional technology by integrating resources that support instructional technology infrastructure, curriculum development, and faculty members' professional development.

Many factors influence the adoption of instructional technology by faculty; however, research by Keengwe, Kidd, and Kyei-Blankson (2009) found that leadership was a major factor affecting technology adoption. The authors suggest that a strong leadership not only had to lead primary technology implementation, but also had to clearly articulate the mission, vision, and goals of such technology initiatives.

Statement of the Problem

Technological advances in medical education have changed the role of program directors and faculty members involved in training future clinician by creating a new skill-set that requires leaders to integrate technology into program instruction. Therefore, in order for military leaders involved in medical education to be effective in integrating technology, they require sufficient leadership skills that focus on staff development and support of changes in the teaching and learning process. Medical schools nationwide have begun to recognize the influence that technology has on current and potential medical students (Ayer & Smith, 1998). In order to attract some of the finest medical students and remain competitive, medical schools must strive to integrate state-of-the-art technology infrastructures into their curriculum.

As military medical training programs strive to remain competitive with their nonmilitary counterparts, the need to understand the role of program leaders and how leadership behaviors may impact the adoption and implementation of technology by faculty members is paramount.

Do military personnel in the position of program leaders have the leadership skills necessary to achieve adoption of technology by faculty members in a physician assistant medical training program within a rapidly changing technological environment? Given this limited research, the literature revealed a need for research to discover how leadership behavior in a military medical learning environment can perceivably influence faculty members' level of adoption of educational technology into their instructions.

Background of the Problem

Green (1999), and Jacobsen (2000), as cited in Zayim, Yildirim, & Saka, (2006), explain that over the past decade medical training programs have devoted a considerable amount of resources into their infrastructure to support the diffusion and implementation of technology. Yet, despite tremendous expenditures for new instructional technology equipment by universities and medical training program, these educational tools are not being adopted into training curriculums by faculty members (Keengwe & Anyanwu, 2007). The United States military has committed significant assets to use modern educational technology to train and educate its personnel who may be deployed anywhere around the world (Watson, 2007). Research by Schrum, Skeele, & Grant (2002) has found that faculty members in many higher education institutions use only word processing technology, but rarely use slightly more sophisticated software programs or hardware devices for teaching or require students to use it for assessment purposes. Similar findings have been noted in both military and civilian medical training programs (Zayim et al., 2006). A variety of studies have examined factors that influence faculty members' decision to use different teaching methods (Choudrie & Dwivedi, 2005; Frank, Zhao, & Borman, 2004; Sherry, Billig, Tavalin, & Gibson, 2000). These studies have three common themes as factors explaining faculty members' willingness or unwillingness to adopt various forms of instructional technologies: (a) leadership styles or behavior patterns, (b) organizational support, and (c) effectiveness in training and support (Choudrie & Dwivedi, 2005; Frank, Zhao, & Borman, 2004; Sherry, Billig, Tavalin, & Gibson, 2000). Saade, Nebebe, and Tan (2007) also described how factors such as faculty's belief and skill were influential in their decision to adopt certain instructional technologies.

Research Questions

This qualitative case study was guided by the following questions:

1. What factors inhibited or facilitated the adoption of instructional technology at the IPAP?
2. How has instructional technology evolved over the last two years at the IPAP?
3. What is the role of program leaders in the integration and adoption of instructional technologies as perceived by IPAP faculty members?

Ultimately, the answers to these questions will provide insight into the factors involved in the adoption of instructional technology by IPAP faculty members.

Definitions of Terms and Constructs

Descriptive definitions of pertinent terms related to this study are as follows:

Adoption: A decision to make full-scale use of a new idea as the best course of action available (Rogers, 1995).

Barriers*:* Factors that impede the diffusion of new instructional technologies by the faculty members.

Commissioned Officers Grades and Ranks: Military officers assigned as instructors and program leaders at the IPAP hold the rank of O-3 through O-6. Table 1 provides a description of each rank and service titles that accompany that rank.

Table 1

Commissioned Officer Grades and Ranks at the IPAP

Grade		Service		
Officer	Air Force	Army	Coast Guard	Navy
O-6	Colonel	Colonel	Captain	Captain
O-5	Lieutenant Colonel	Lieutenant Colonel	Commander	Commander
O-4	Major	Major	Lieutenant Commander	Lieutenant Commander
O-3	Captain	Captain	Lieutenant	Lieutenant

Note. The letter "O" represent Officer.

Diffusion: "The process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 11).

Educational technology: Seels and Richey (1994) define educational technology as the study and practice of facilitating learning and improving performance by creating, using, and managing appropriate technology processes and resources.

Faculty members: Professors, assistant professors, military medical doctors, physician assistants, and nurses involved in teaching in the basic sciences and clinical science disciplines at a military school of health sciences.

Instructional technology (IT) and Technology-based instruction (TBI): refers to learning through media other than direct classroom instruction. Besides computers and computer software, instructional technology described tools and equipment used for teaching and learning such as computers, web-based instructional software, cameras, CD-DVD players, PDA's, smart phones, calculators and electronic devices yet to be created. In addition, electronic devices that are used during all instruction for, problem-solving, and decision-making by students and faculty involved in the practice of medicine.

Leadership: Koontz, O'Donnell, and Weihrich (1984) define leadership as "the art or process of influencing people so that they will strive willingly and enthusiastically toward the achievement of group goals (p. 506).

Leadership style: Hersey and Blanchard (1988) defined leadership style as "the consistent behavior patterns that they use when they are working and through other people, as perceived by those people" (p. 146).

Physician Assistant (PAs): "Physician assistants are health care professionals licensed, or in the case of those employed by the federal government they are credentialed, to practice medicine with physician supervision. As part of their comprehensive responsibilities, PAs conduct physical exams, diagnose and treat illnesses, order and interpret tests, counsel on preventive health care, assist in surgery, and write prescriptions. Within the physician-PA relationship, physician assistants exercise autonomy in medical decision making and provide a broad range of diagnostic and therapeutic services. A PA's practice may also include education, research, and administrative services" (AAPA, 2008, What is a PA, ¶1).

Program Leaders: For the purpose of this study, program leaders are defined as a community of experienced healthcare professionals that makes up the senior leadership of the Interservice Physician Assistant Program (IPAP) program. IPAP program leaders hold the following positions (see Appendix L, page 204):

1. ***Program Director:*** As it relates to the Physician Assistant profession, the program director is a physician assistant normally holding the military rank of O-6. Administrative

duties may include but not limited to: (a) providing leadership and coordination to faculty and students, (b) budget management, and (c) planning and analysis for the growth and development of the PA program.

2. ***Clinical Coordinator:*** A physician assistant normally holding the military rank of O-5. Administrative duties include (a) being the central point of contact and liaison for all Phase II clinical training related issues, (b) report to the Program Director on matters related to quality of training and student progress through training, (c) member of the Executive plus Committee, and (d) assists the Program Director with accreditation issues.
3. ***Medical Director:*** A licensed physician (MD or DO) usually holding the rank of O-5, board certified in the primary care specialty of Family Practice/ Internal Medicine. Duties may include but not limited to (a) analyzing requirements of PA training, concentrating on outpatient medicine at primary care level, (b) ensure that Phase I training provides basic science skills in didactic medical courses and clinical training, and (c) member of the Executive plus Committee.
4. ***Academic Coordinator:*** A civilian instructor certified physician assistant who is knowledgeable in developing learning objectives and curriculum for the IPAP. Other duties include: (a) establishing course schedules for Phase I of the program, (b) point of contact for curriculum changes, (c) oversees all scheduling issues and conflicts, (d) reviews and monitors curriculum changes, (e) members of the Executive plus Committee, and (f) representative to the AMEDD Center and School Graduate School Curriculum Committee.

5. ***Director of Academic Curriculum:*** This position is held by an O-5 through O-6 faculty member. Administrative duties may include but not limited to: (a) supports, advocate for, and works collaboratively with the Program Director and other program leaders, ensuring implementation of recommendations based upon assessment results, and (b) member of the Executive plus Committee.
6. ***Senior Service Representative (Members of the Executive plus Committee):*** This individual is the senior military faculty member by date of rank (holding the current military rank longer than others). As a senior service representative from the Army, Navy, Air Force, or Coast Guard, this individual is a member of the Executive plus Committee with voting rights on IPAP issues and recommendations.
7. ***NCOIC (Non-Commissioned Officer in Charge):*** The NCOIC is an individual in the enlisted ranks usually holding the rank of E-7. Duties may include but not limited to: (a) supervise enlisted staff members assigned to the IPAP. (b) perform duties as a Phase I instructor for courses such as BLS (Basic Life Support) and IV (Intravenous) therapy, (c) coordinates procurement of teaching and learning resources for faculty members and students, (d) coordinates with AMEDD C&S departments and other outside agencies for classrooms work order issues, and (e) works collaboratively with the Program Director and other program leaders on implementing recommended changes.

Technology: For the purpose of this study, the term technology is used to describe a variety of ways electronic technology devices are integrated into the learning process of a medical training program. Descriptors for technology used in this type of environment include, but are not limited to, the following: technology-mediated learning, computer-aided instruction, distance education, distance learning, educational technology, home learning technologies, computer-based education, instructional technology, multimedia, communications systems, Web-based learning, educational multimedia applications, and computer-mediated communication.

Technology integration: the incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools. Technology resources are computers and specialized software, network-based communication systems, and other equipment and infrastructure (IES National Center for Education Statistics, ¶ 2).

Significance of the Study

The importance of leadership in the adoption of educational technology has routinely been emphasized by researchers (Price, 2007); however, there is little research specifically relating to the perceived role of military medical program leaders to instructional technology adoption by faculty members. The primary significance of this study was to identify and examine the roles of leadership in the integration and adoption of instructional technology in a military medical learning environment as perceived by their faculty members. In addition, this study examined usage patterns and characteristics of faculty members using instructional technologies in their curricula, in this distinctive learning environment. Additionally, this study identified factors that facilitated of inhibited their use of this technology. From this knowledge, military leaders assigned as program leaders will better understand the influence of their leadership behaviors has on faculty members' utilization of instructional technology in their curriculum. In addition, this study highlighted the types of leadership behaviors and faculty members' characteristics associated with the adoption of technology.

Furthermore, this study will contribute additional information to the literature related to the adoption and integration of technology into medical school training programs. The findings of this study could serve as a useful resource for future studies on technology integration in both civilian and military medical learning environments with similar, unique characteristics.

Delimitations and Limitations of the Study

Delimitations

Lunenburg and Irby (2008) define delimitation as "self-imposed boundaries set by the researcher on the purpose and scope of the study" (p. 134).

This case study was delimited in the following ways:

1. Since the case study concerns educational technology use in a military medical learning environment, it focused on the program leadership and faculty members of the only military physician assistant program in the United States. Therefore, this study was confined to interviewing, analyzing documents, and observing the Interservice Physician Assistant Program.
2. A purposeful sampling technique was used to gather rich and thick information about the participants. The criteria for selection was bordered by factors such as age, gender, educational level, military branch affiliation, and years assigned at the IPAP. The researcher quest to gather rich descriptive information from the participants took precedence over using other sampling methods.

3. Strauss and Corbin (1994) suggested that natural bias is inevitably introduced into any research study by the investigator. The researcher familiarity with the phenomenon under investigation could be viewed as a bias concern. Thus, the researcher designed this study using triangulation of multiple data sources to force a deeper understanding of the phenomenon rather than examining its familiar surface features.
4. According to Rogers (2003), adopting and implementing technological innovations occurs over time; this case study looked at faculty adoption and use of instructional technology at a particular point in time. A delimiting time frame of two years was decided upon by the researcher to ensure familiarity of the organization by faculty members, as well as historical knowledge of technology use at the IPAP. Additionally, with the frequent turnover of military faculty members occurring at least every two years, this time frame limitation was appropriate. Therefore, the continued progression of technology adoption by faculty members was not covered in this study. Instead, the researcher observed attitudes and conditions that are associated with faculty member's use of technology in their curriculum.

Limitations

Creswell (2005) defines limitations as "potential weaknesses or problems" identified by researchers that may negatively affect the results or generalizability of data collection and analysis (p. 593).

The following limitations were present in this case study:

1. This case study presented some limitations, several of which were related to the sample. The research participants consisted of the program leaders and faculty

members from the IPAP. This was a limitation because of the extremely small group represented in this study.

2. The combined Armed Forces program makes this a unique research project. However, the uniqueness has its disadvantage, which can be attributed to the culture of the group. Whereas in a military culture, subjects tend to be less critical of superiors, this possible lack of openness may limit this ability of the study to truly gauge leadership behaviors in facilitating or inhibiting instructional technology adoption. The uniqueness of a military culture can also foster similar thought patterns in policy decisions.
3. Time and cost constraints prohibit the extension of this study to the Uniformed Services University of the Health Sciences, (Army, Air Force, Navy and Public Health) joint service medical school, or other civilian physician assistant and medical school training programs. These constraints presented a limitation for this study.

Overview of the Study

This study is organized into five chapters in the following manner:

Chapter one includes an introduction, the statement of the problem, the background of the problem, the research questions, definitions of terms and constructs, significance of the study, and delimitations and limitations of the study.

Chapter two provides the literature review of the readings that are relevant to this case study.

Chapter three describes in detail the methods that were used for this study, including an overview of the case study, the purpose of the study, research design, research questions, qualitative procedures, participants' selection, data collection: instrumentation and procedure, data management and analysis, trustworthiness, and delimitations and limitations.

Chapter four describes in detail an explanation of the findings by first presenting an organizational overview of the research site, then an introduction of participants in the study joined by a rich description of each participant. Secondly, characteristics of participants, profile of participants, and resulting themes and categories are presented. Next, an analysis and interpretation of findings are offered as they relate to the research questions. Finally, the delimitations and limitations were revisited and compared to the actual findings of this study.

Chapter five provides conclusions and recommendations from the findings of this study as well as an overall reflection on the findings by the researcher.

CHAPTER II: REVIEW OF LITERATURE

This chapter offers a discussion of the literature surrounding the utilization of modern educational technology as an instructional tool in a military medicine learning environment. The following subsidiary questions derived from the review of literature will assist the researcher in examining factors that inhibited or facilitated the adoption of technology by faculty members.

1. What types of leadership behaviors are amendable to instructional technology adoption into military medical training?
2. Why is the use of technology a critical competence for professionals, particularly military medical practitioners?
3. How is technology being used in medicine and medical education?
4. How does one successfully integrate a technological innovation?
5. How is educational technology being adopted by faculty?
6. What factors and variables should be considered when integrating technology into medical education programs?
7. What are some shortcomings of technology to consider when implementing its use into medical education?
8. How do demographic variables impact instructional technology implementation?
9. What are some challenges facing medicine leadership and pressures facing the medical instruction profession?

Leadership Behaviors Typically Exhibited in Military Medical Education

Military leaders involved in education and training should consider the role that technology has in improving student's ability to learn new information as well as a leader's role in presenting new information via technology (Blascovich & Hartel, 2008).

Instructional technology has grown in popularity and, according to Blascovich and Hartel (2008), has the potential to improve the effectiveness and efficiency of military medical training. Currently, students have been exposed to technology used in education from computers, television, hand-held devices, and video games since childhood. As a result, technology instruction has become valuable to military learning environments since the mid 1980s (Blascovich & Hartel, 2008; Seidel & Weddle, 2008; Stapp, 2001).

Addressing the needs of military personnel through technology is a system wide effort (Reifman, Gilbert, Fagan, & Satava, 2002). Furthermore, military leaders involved in education are expected to possess a wide-range of leadership skills, skills that can handle both leadership and technology issues. The role of leadership in technology may involve a combination of strategies and techniques that are fairly common to most leaders but require attention to some specifics of technology. Therefore, technological leaders must be able to stay familiar with current and future technologies, plus recognize how changes in technology can affect the professional development of faculty and students (Prather & Jones, 2003).

The importance of leadership in military organizations cannot be underestimated. The Canadian Forces (2005) define effective military leadership as "directing, motivating and enabling others to accomplish the mission professionally and ethically, while developing or improving capabilities that contribute to mission success" (p. 30).

Bass (1990) considered leadership to be an important component of how organizations function; most noticeably in a military learning environment. Bass (1990) pointed out that U.S. military service academies stress leadership education significantly more than business schools. Similarly, Bruce and Vermakis (1996) found that leadership in military medicine is built on a long standing tradition of leadership that produces a cohesive unit loyal to the organization it represents.

According to Bass and Avolio (1997), there is a full range of leadership models, with three styles of leadership being classified as interpersonal managerial behaviors: transformational, transactional, and laissez-faire. In a military medical training environment, these three types of leadership styles may be used to meet the mission of the organization (Xirasagar, Samuels, & Curtin, 2006). Schepers, Wetzels, and Ruyter (2005) observed that out of the three leadership styles, transformational leaders were more receptive toward accepting technologies within service organizations. Additionally, research by Yammarino and Bass (1990) found that many military leaders demonstrated transformational leadership traits when compared to transactional and laissez-faire leadership styles.

Leadership Behaviors and Adoption of Instructional Technology

United States military medicine has recognized the need to introduce new technology into medical training to retain a competitive advantage. Introducing new technology into an organization is often considered a challenge due to either acceptance or opposition by leaders and employees (Schepers, et al., 2005). The successful adoption of instructional technology requires strong leadership at every level of the organization (Garrison & Akyol, 2009). Leadership must have the ability to articulate the mission, vision, and goals of an organization to encourage adoption of technology implementation (Keengwe, Kidd, & Kyei-Blankson, 2009). Tornatzky and Fleisher (1990) explain that school leadership should create an environment that has a clear image of strategies for successful instructional technology adoption by staff members. In addition, Brandyberry (2003) found the depth of bureaucracy coupled with internal and external communications sharing affect the likelihood of instructional technology adoption by faculty members. Therefore, leaders must be adept in creating an environment that demonstrates a culture of innovation, which may eventually convince faculty members that instructional technology will enhance or improve their current teaching methods (Osborne, Costello, Datta, & Shattuck, 2004).

Developing strategies to reduce resistance in integrating technology into curriculum requires skillful leaders that have the ability to “switch between various leadership styles, depending on the situation” (Goleman, Boyatzis, & McKee, 2002, p. 53). According to the authors, a leader can be visionary, coercive or commanding, affiliative, democratic, pacesetter, and a trainer or coach. In addition leadership interventions like “offering training and education, and organizational technical support” have shown to play a role in influencing individual use of technological innovations (Schillewaert, Ahearne, Frambach, & Moenaert, 2005, p. 325).

Situational Leadership® Theory

The study of leadership behaviors has been a popular topic for debate since researchers first recognized the impact of leadership on organizational success. During the study of leadership behaviors, researchers found that the performance of leaders in various situations contributes to their success or failure (Kotter, 1988). Ansari (1990) noted that during the 1970s, researchers focus on the behaviors of leaders when they were placed in various situations. During this timeframe, two contingency models dominated the situational approach to leadership; Fielder's contingency model and Hersey and Blanchard Situational Leadership® Theory (SLT).

According to Montana and Charnov (2000), Frederick Fiedler's contingency theory is one of the earliest and most influential theories. The theory suggested that "the effectiveness of an organizational group was dependent on two main factors: the personality of the leader and the degree to which the situation gave the leader power, control and influence over the situation" (Fielder, 1974, p. 65).

Fiedler (1973) recognized three contingencies that determine appropriate leadership behaviors: leader-member relations, task structure, and leader-position power. The first contingency is leader-member relations, which seeks to build strong relationships between themselves and coworkers. Fielder's second contingency is task structure, leader's focuses primarily on accomplishing the task set forth. The final contingency is position power, the leader holds the positional power to reward or punish the group members on the basis of performance.

Hersey and Blanchard (1976) first developed the SLT in 1969. According to Vecchio, Bullis, and Brazil (2006), the SLT was adopted into the U.S. military shortly after its development, and continues to be used in military leadership training. Furthermore, the relevance of SLT for military leaders, and leaders in other contexts, has been recognized for some time. For example, the U.S. Army has used the SLT as a developmental tool for training officers, and the U.S. Air Force uses SLT in most of its leader training programs for officers and noncommissioned officers (Cook, 1992; Yeakey, 2002).

Hersey and Blanchard (1988) maintain that leaders are successful when they are able to adjust their style of leadership to the readiness level of followers. According to Chance and Chance (2002), Hersey and Blanchard believed that "there is not one most effective or preferred leadership style, but rather that the effectiveness of leadership styles is contingent upon a number of other factors" (p. 119).

Hersey and Blanchard (1988) described the Situational Leadership® model as having four quadrants (Figure 1) that characterized basic leadership styles, namely (S1) telling (high task and low relationship), (S2) selling (high task and high relationship), (S3) participating (low task and high relationship), and (S4) delegating (low task and low relationship). The leadership model illustrates how leadership style (S1-4) may coincide with the situation. The authors define readiness as "the extent to which a follower demonstrates the ability and willingness to accomplish a specific task" (p. 174). According to Hersey and Blanchard, the combination of job readiness and psychological readiness yield four different levels of readiness (R1–R4). The authors note that as follower's readiness increases, "a leader should rely more on relationship behavior and less on task behavior" (p.174).

Hersey and Blanchard (1988) define the four stages of follower readiness as:

1. *Situation R1—Low readiness.* When followers are both unable and or unwilling to take responsibility to do something. The leader should emphasize task-oriented behavior and be very directive and autocratic, using a *telling* style.

2. *Situation R2—Moderate readiness.* When followers are unable but willing to do the necessary job tasks. They are motivated but currently lack the appropriate skills. The leader should focus on being more relationship-oriented, using a *selling* style.

3. *Situation R3—Moderate-to-high readiness.* Followers are able but unwilling or too apprehensive to do what the leader wants. The leader usually needs to provide a high degree of relationship-oriented behavior but a low degree of task behavior, thus engaging in a *participating* style.

4. *Situation R4—High readiness.* "When followers are able, willing, and confident, they are self-sufficient and competent. Thus the leader can grant them considerable autonomy, using a *delegating* style" (p. 176-177).

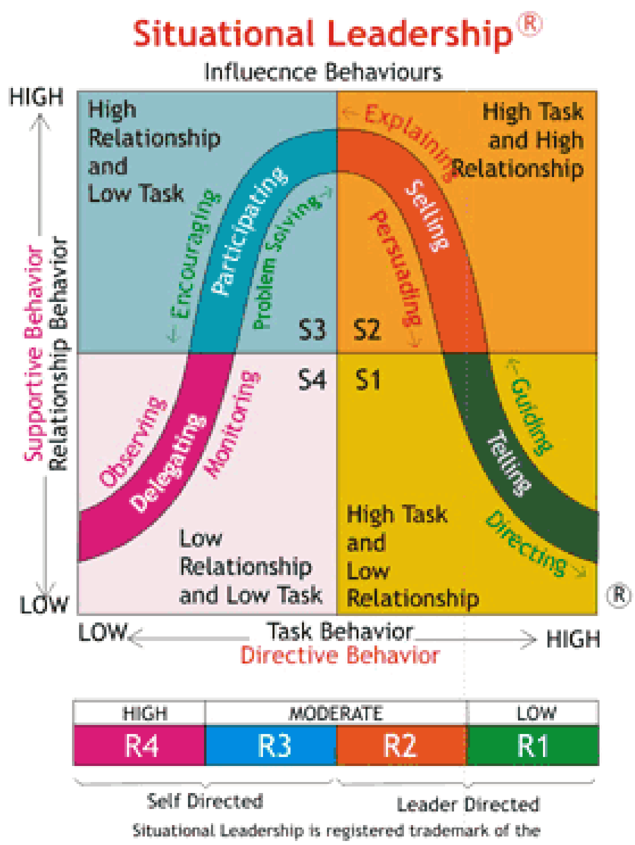


Figure 1. [used with permission] Situational Leadership® Behavior Model

The Leader Effectiveness and Adaptability Description (LEAD) - Self instrument was created by Hersey and Blanchard in 1974 (Hersey & Blanchard, 1988). The authors describe the

LEAD-Self questionnaire as a tool to help managers measure their leadership styles. The LEAD-Self presents leaders with twelve leadership situations in which leaders select one of four options that best depicts what their action would be in that particular scenario. The LEAD-Self measures self-perception of leadership style, style range, and style adaptability. Leadership style is defined as "the consistent behavior patterns that they use when they are working and through other people, as perceived by those people" (p. 271). Style range is described as "the extent to which a leader can vary their leadership style in different situations, and style adaptability reflects the degree to which a leader changes their style to match the readiness or maturity level of the people involved in the situation" (Hersey & Blanchard, 1988, p. 273). In short, what style of leadership (Telling, Selling, Participating or Delegating) is most effective for integrating technology into a military medical learning environment? It depends on the situation and/or circumstances facing program leaders. And as Hersey and Blanchard (2008) pointed out, a leader must assess their follower's maturity level at a given time to exercise effective leadership. When integrating new technologies into an organization the maturity level of faculty members can wax and wane depending on various internal and external factors.

Use of Technology in Medical Education – A Professional Competence

Instructional Technology Utilization

Leaders of military medical educational institutions, as well as leaders of any modern organizational, must justify their investment of scarce resources in technology. The question often posed to educational program directors is whether technology used for instruction is an improvement over the existing form of instruction (Fletcher, Hawley, & Piele, 1990)?

Numerous studies have been conducted on the effectiveness of technology when used during educational coursework (Fletcher, 1990). The issue according to Fletcher "is not to determine whether these applications are a good way to teach or if they teach the right thing, but simply to see if they teach anything" (National Research Council, Modeling and Simulation, p. 45). Based on comparison studies, Fletcher is of the position that they do. He notes a study that "compared the applications of interactive videodisk instruction to placebo treatments in which no instructional material was presented. The average effect size for these studies was 1.38, suggesting an average improvement in student achievement due to the presence of this technology from 50th to 92nd percentile performance"(National Research Council, Modeling and Simulation [NRC,M&S], 1997, p. 45). Furthermore, Suppes, Fletcher, and Zanotti (1976) described an earlier studies performed by the National Research Council, Modeling and Simulation, Volume 4, which traced student's progress, or trajectories, through instructional material. "These studies found that based solely on the amount of time students spent in computer-based instruction; the improvement of each student on a standardized test of total mathematics achievement could be predicted to the nearest tenth of a grade placement, within 99 percent confidence limits" (NRC,M&S, 1997, p. 45).

Ruebling, Stow, Kayona, and Clarke (2004) found that educational leaders who promote instructional technology were a key ingredient in the success of a curriculum success. Further research has demonstrated that leaders involved in the implementation of technology into coursework are aware of its value in enhancing students' performance (Buck & Horton, 1996).

Integration of Technology into Medical Training

Information technology has created a well informed patient population which has led to a health care delivery system that demands a new type of physician leadership (Prather & Jones, 2003). Conducting day-to-day interactions with well informed patients will require medical training programs to enhance their curriculum to prepare for these types of patients (Margo, Dixon, Pearce, & Reed, 2006). Naturally, these technological influences are being felt in military medicine educational facilities. Advances in science and technology have increased challenges facing military educational leaders (Mulford, Kendall, Edmunds, Kendall, Ewington, & Silins, 2007). Well-informed patient populations have resulted in pressures on both leaders involved in education and their students to provide the best and the most current level of care (Bohen, 2006). In a health care environment Mulford, et al. (2007) describe how patients expect and demand their clinician to be able to provide immediate responses, customized solutions and access to information. Thus, medically trained personnel that lack the expertise to retrieve and used current technology to enhance their ability to practice medicine will suffer as a medical provider. According to Mulford, et al. (2007), technology will permit learning to take place virtually anywhere in the world, creating a need for medical training facilities to embrace this trend.

The literature reviewed showed that technology-based instruction is being integrated into learning curriculum throughout business, government, and higher education programs. According to Sugrue and Rivera (2005), the "percentage of organizations using technology delivered training increased from 8 percent to 24 percent in fewer than four years" (p. 22). The training needs of the military have expanded from the need to teach skills in isolated locations, such as having a military clinician in a war zone receive specialized consultations from a cardiologist, dermatologist, or endocrinologist several thousand miles away (Bailey, 1998).

In addition, Ozuah (2002) commented that technology is challenging because it is a "moving target that constantly changes, improves, gets faster," and becomes all encompassing (p. 2). Ozuah (2002) argued that many medical schools barely use all the educational possibilities of technology, either in the classroom or the non-classroom environment. Furthermore, he adds that cost is a significant barrier, but points out that future medical students are going to be using computer technology much more than students of today, and notes that we have to train our students now by introducing more technology-base instruction. According to Piemme (1988), the majority of medical schools in the United States are using technology to assist with portions of their standard curriculum. Assuming that future students involved in clinical training are going to be using technology much more, we have to train our military medical students now for technological advances of tomorrow (Satava, 1995).

Baker and O'Neal (2003), explain that in a military environment, "technology is an integral part of training and education" (p. 171). Similarly, Graesser and King (2007), note that advanced technological learning environments hold potential for individual and teams in learning environments used by civilian and military organizations. Barnett (1995) noticed that medical students attending Harvard Medical School during the mid 1990s "rejected lecture-based method of education" (p.285). During this period, Harvard's medical school curriculum consisted of students attending three to five lectures each day. The author described these lectures as "being poorly attended and noted that students who did attend these lectures exhibited evidence of sleep deprivation" (p. 285). Barnett (1995) also found that most medical students during this period including military medical schools had a liberal arts background, which meant that they were use to a large amount of independent study. These students, according to Barnett, "felt that the didactic passive educational strategy was neither appropriate nor acceptable and therefore deemed that the lectures were not worthy of their participation" (p.285). Likewise, comparable findings were observed in students in both civilian and military medical training programs (Haluck & Krummel, 2000). The authors believed that the traditional teaching methods of lecture and "see one, do one, teach one" to train future physicians were no longer adequate.

Chumley, Dobbie, and Delzell (2006) augured that current medical school graduates are finding that patient encounters require the use of "multiple technology enhanced decision support systems" (p. 1). The authors found that "current medical student training in ambulatory settings may not prepare students for this type of practice" and suggest medical students and graduates take advantage of information management tools (p. 1). Chumley et al. (2006) describe how information management tools like wireless personal digital assistants (PDAs) and computers can enhance medical students' and graduates' ability to manage ambulatory patient encounters. Unlike the uninterested Harvard medical students mentioned by Barnett (1995), students exposed to information management skills during their medical training tend to enhance their proficiency in "asking and refining clinical questions; accessing, retrieving, integrating and applying information into a clinical situation" (Chumley et al., 2006, p. 1).

Another finding by Barnett (1995) was that medical students have considerable difficulty remembering and integrating the large volume of information they were exposed to during the four years of medical school training. Also disturbing was the number of physicians graduating medical training who rapidly became outdated in fields other than their own specialty. The technology explosion in medical knowledge plus the development of new methods for diagnosis and treatment of illness created a formidable task for medical students, physicians, and educators to keep abreast of the medical knowledge base. This rapid expansion of knowledge according to Barnett has placed impossible time demands on many medical school programs including the U.S. military. The volume of information required by health care professionals to remain currents of medical literature is tremendous. Barnett (1995) argues that "over six hundred thousand articles are published in the biomedical literature each year, and estimates that if a student read two articles per day annually, that student would be over 800 years behind" (p. 286). Bradley and Fowler (2001) suggest that this increased use of technology can address this problem by providing students and clinicians with rapid retrieval and access to current medical information. Furthermore, unlimited storage of medical training information can be stored onto small devices for quick access or maintained by a knowledge management company off-site.

Advances in technology and the changing medical education environment are likely to ensure the curriculum in medical school training will continue to evolve (Gregoratos & Miller, 1999).

Benefits of Instructional Technologies

Marquardt and Kearsley (1999) notes that an important advantage of technology-based instruction is the dramatic cost savings it has on a training program. He points out the following:

> *Savings occur because of the ability to use fewer instructors to reach many more participants, reduce travel expenses, and reduce down time (when people might otherwise have to leave their offices), and the ability to train a dispersed work force at the same time (synchronous) or different times*

(asynchronous). There is also growing ease and simplicity in developing and maintaining learning packages, data bases, and internet sites with a minimum of cost and time. (p. 61).

Training Modernization

Being able to easily access information and acquire skills is essential so employees are not discouraged from using technology (Marquardt & Kearsley, 1999). New technology has created a learning environment in which trainee and students can navigate learning materials by simply pointing-and-clicking to gain access to information. Technology such as touchpad's, the intranet, clickers (Interactive Personal Response Systems allows students the capability to interact and answer questions electronically with other students in a classroom environment), and interactive medical patient simulators allow for hands-on, direct, and immediate interaction with instructors and/or fellow students. Groupware, *Blackboard*, and other chat rooms tools can also be easily integrated into the learning curriculum. Marquardt & Kearsley (1999) also found the following advantages in modernizing training:

1. Uniformity of content delivery, means improved consistency of training instruction from the same person or system throughout the organization. In a military environment, centralization and consistency of information is paramount in passing down information to a large population of personnel.

2. Various learning styles such as visual, aural, and kinesthetic can be accounted for with various forms of technology. Technologies can be adapted to the motivational levels of the learner. The best technology for motivated learners according to Marquardt &

Kearsley (1999) is video, self-paced workbooks, audiotapes, and digitized information found on CDs and DVDs.

3. Virtual reality technology has increased safety and flexibility by allowing users to view objects from numerous angles and viewpoints. This capability creates a virtual observation that would be impractical in a real life environment. For example it is not practical or safe to repeatedly use radiographic (X-rays) to diagnosis a skull or brain injury; newer technological advances such as training with cyber technology such as Computed Tomography (CT) Scans or Positron Emission Tomography (PET) Scans, allow faculty members to teach students without harming anyone as a result of exposing them to excessive gamma rays.
4. Technologies allow training institutions to constantly update their instruction information, especially those available via the Web. Intranet sites can easily and inexpensively be amended as needed.

Information overload can be avoided by using technology. For example, employees, and students are usually provided with a significant amount of information that is difficult to process or memorize in a brief amount of time. Technologies like web browsers allow access to a large volume of information by simply pressing a few key strokes from computers, thus allowing the researcher to have a more focused search of information by narrowing or refining their word search.

Barriers and Impediments to Instructional Technology

In recent years, countless researchers have discussed some of the shortcomings and barriers that have contributed to faculty members embracing or rejecting technology for instructional purposes (Daly, 1997). According to Albright (1996), such problems as technologies difficulties, inadequate resource infrastructure, server systems failures, software limitations, technological skills and limited training and support contributed to barriers that faculty members faced. Creighton (2003) found that the integration of technology into an educational program commonly failed because of “inappropriate leadership (too little or too much), moving too fast, without sufficient and supportive staff development, and failure to get the right people on board” (p. 21). Rogers (2003) believes the availability of educational technologies such as access to computers may be a factor that affects the integration of technology by faculty members. Rogers also suggest that trialability and observability are two key variables that have influence on the rate of adoption of an innovation. Research by Zakaria (2001), found that inadequate exposure to computers created a barrier for implementing instructional technology into faculty member’s curricula. A similar study conducted by Sumner and Hostetler (1999) found that the availability of physical resources such as equipment and technical support were important factors that influence faculty member’s decision to use electronic technologies.

In addition, Berman and McLaughlin (1978) conducted a Rand Corporation Study and found that innovations were slow or failed to be implemented when leadership failed to understand the intricate nature of their educational program. According to Berman and McLaughlin, adding new technology to educational programs may have good intention to make faculty members better or more efficient; nevertheless they must accept that the new technology is better than their current tools.

Adoption of Instructional Technology

According to Rogers (2003), faculty members tend to adopt technological innovations at various stages. Rogers believed that researchers should classify stages into five categories based on certain characteristics associated with the faculty member(s) or educational facility. He found that a researcher routinely used the time of adoption as a variable to establish a progression for when technological instruction is integrated into a program. Rogers (1995) also discovered that the adoption of an innovation took on the appearance of a normal bell-shaped curve when plotted over time on a frequency basis. An S-shaped curve was noted by Rogers (1995) when the cumulative number of adopters was plotted. The following variables were identified by Rogers (1995) as factors that determine the rate of adoption of innovations.

1. Characteristics of the Decision-Making Unit
    a. socioeconomics characteristics
    b. personality variables
    c. communication behavior
2. Perceived Characteristics of Innovations:
    a. relative advantage
    b. compatibility
    c. complexity
    d. trialability
    e. observability

The adoption of an innovation such as instructional technology is a systematic progression based on Rogers's theory on adopter categories. Rogers (2003) adoption theory suggests that personal and social characteristics of potential adopters (medical faculty in this case) would affect their innovation-decision process and adoption. However, there has been little research conducted about instructional technology use on medical school faculty (Zayim, 2004). A study was conducted in Finland, which looked at attitudes of medical teachers and students toward information and, current use of information technologies found that email and the internet was the primary computer technology used by faculty and students (Slotte, Wangel & Loka, 2001). Another finding of this study reveals that medical school faculty used computer technology primarily for research rather than for classroom instruction (Slotte et al, 2001).

General Diffusion Theory

Literature suggests that Everett M. Rogers studies on diffusion of innovations are the most widely-used theory used by researcher (Fichman, 2000). Roger' book Diffusion of Innovations, first published in 1960, and now in its fifth edition (Rogers, 2003), provides a sufficient outline of diffusion of innovations theory. This model has been used by many researchers and was used in this study to review the literature pertaining to the adoption of instructional technology by medical training faculty members. It provided guidance for looking at their behaviors and deciding which components required additional effort if diffusion is to occur. According to Rogers (2003), this theory takes into consideration aspects of the innovation of new technology, style of communication, steps in decision making, and social context.

Characteristics of Innovations

As noted above, the five perceived characteristics are: relative advantage, compatibility, complexity, trialability, and observability.

1. Relative advantage is defined as “the degree to which an innovation is perceived as better than the idea it supersedes” (Rogers, 2003, p. 15). In a military medical training environment, a technological innovation may be perceived as having a higher relative advantage if it offers more fiscal savings such as decrease cost to implement and maintain as compared to former technologies, or if it saved time but still produced a quality end product.

2. Compatibility is “a measure of the degree to which an innovation is perceived as being compatible with existing values, past experiences, and the needs of potential adopters” (Rogers, 2003, p. 15). To increase the possibility of adoption, the innovation must address issues that senior leaders or faculty members perceive to be a problem. In this study, compatibility was associated with the degree to which faculty members feel that instructional technologies will promote their ability to provide quality and efficient training.

3. Complexity is defined as “the degree to which an innovation is perceived as difficult to understand and use” (p. 16). The likelihood of an innovation being adopted is increased of it is simple and well defined (Rogers, 2003). For example, if faculty and students find it easier to use *Blackboard* technology to communicate between classes rather than telephone and email, then this innovation will be adopted. However, if faculty and

students have insufficient expertise in navigating through *Blackboard*, they may become disillusioned and abandon its use.

4. Trialability is the degree to which innovation may be used on a try-out basis prior to adoption (Rogers, 2003). In a medical training environment, having the ability to test a potential instrument that will benefit their teaching methods may have a high adoption rate after the trail period.

5. Observability is “the degree to which the results of the innovation are visible to others” (p. 16). According to Rogers (2003), the more an innovation is observed by peers and colleagues, the more likely it is that the results of its adoption will be accepted by others. In an educational environment, visibility of an innovation may stimulate other faculty members to adopt a new technology or request more information about it. According to Denis, Herbert, and Langley (2002), if a respected and influential faculty member often uses the new innovation, it is likely peers will adopt this new technology.

Rogers also described five stages in the innovation-decision process and the conditions that influence the adoption levels. These stages can be related to the instructional technologies that military medicine educational faculty members are required to adopt. According to Rogers (2003), the five stages an innovation proceeds through the adoption process include:

1. knowledge (exposure and understanding)
2. persuasion (forming an attitude)
3. decision (commitment to adoption)
4. implementation (put a new idea into use)

5. confirmation (reinforcement because of positive outcomes)

Rogers' (2003) diffusion model as described by these five characteristics and stages is one conceptual approach to understanding the rate of adoption of innovations. The diffusion model can provide useful insights into why the acceptance and implementation of new instructional technologies either fail or succeed.

Demographics Shaping Leaders Attitudes

In relationship to leadership styles, Hambrick and Mason (1984) noted, "demographic traits of the leaders such as age, tenure in the organization, functional background, education, socioeconomic roots, and financial position all contribute to the leadership style of the authoritative figure" (p. 196). Hambrick and Mason formalized the upper echelon perspectives, which proposed personnel make strategic choices on the basis of their cognitions and values shaped by their demographic background and that the organization becomes a reflection of its top leadership. The 'upper echelons perspective' theorized by Hambrick and Mason (1984), showed that "organizational outcomes, strategic choices and performance levels are partially predicted by decision-making background characteristics" (p. 197). Hambrick and Mason describe what is being predicted is background variables that help shape directors values. The authors suggest that based on certain demographic information, one can almost predict behavior traits that are commonly seen in others with exposure to similar demographic conditions. For example psychological values and observable characteristics "age, functional tracks, education, socioeconomic roots, and group characteristics" can predict strategic choices of faculty members (p. 198). Strategic choices by faculty as described by Hambrick and Mason are "product innovations, acquisition, capital intensity, and administrative complexity" just to name a few (p.

198). Additionally, Hambrick and Mason describe several studies that found an association between the age of top executives and organizational growth or decline. Katz and Salaway (2004) believe that background characteristics shape leaders view on technology use in their organization. Research by Sandholz, Ringstaff, and Dwyer (1997) found that school leader's perception of technology was essential in faculty member's decisions to integrate technology into their curriculum. According to Creighton (2003), successful adoption and integration of instructional technology requires school leaders that are "competent at such things as planning, organizing, problem solving, vision building, communication, and instruction supervision" (p. 20). Fullan and Stiegelbauer (1991) suggest that leadership strength lies in their ability to cope with change. Furthermore, in the military, uncertainty and unpredictability is a common challenge for its leaders (Blascovich & Hartel, 2008). MacIntyre (2008) propose that attitudes and behavior of leaders influences how followers will react, adapt, and behave in an organization. MacIntyre also points out that once a leader forms certain attitudes, they are more resistant to change. Also, MacIntyre argues that the degree of importance associated with the given attitude, has a parallel relationship to the amount of resistance to change. Krosnick (1988) associates these relations to attitudes, beliefs, and values. Krosnick (1988) points out that leaders attitudes are shaped by early exposure to certain ideas and values that become a stable force in ones opinions toward future exposure to the same or similar things. The author notes that important preexisting attitudes are accompanied by stores of facts which can be used to counter-argue opposing information. The author further describes how people tend to be attracted to others with similar attitudes, and suggest these attitudes are reinforced by social norms. Finally, Krosnick (1988) augured that people are more likely to commit themselves in an open environment to positions they consider similar to their views, which increases their resistance to change. Before a leader can be influential in teaching students new ideas, that leader must be perceived as being open to change (Vander Zanden, 1977). Thus, institutional changes must occur at each level, ranging from top administrative officials, faculty, and trainees. Therefore, personnel must buy-in to the notion that change is good for them as well as the organization (Martich, Waldmann, & Imhoff, 2004). Consequently, in order for leaders and faculty members to develop a positive outlook toward instructional technology, and overcome anxieties and negative bias, they must increase their familiarity with technology (Martich et al., 2004).

Demographic traits and characteristics are variables that should be considered in the analysis of educator's decision to adopt or reject computer technologies (Spotts, 1999).

Challenges Facing Military Medical Educational Leaders

Military leaders especially in the healthcare field face the leadership crucible of meeting military mission requirements within an environment of increased operational tempo, assignment transfers, and vigorous leadership selection procedures (De Lorenzo, 2008). The role of the United States military in world affairs has increased since September 11, 2001. "As a result, the military relies on leaders, not managers, program directors, or supervisors, to accomplish its primary mission" (Wong, Bliese, & McGurk, 2003, p. 660)." Wong, et al. (2003) argues that "culturally, leadership was and continues to be a mainstay of the military. Long before leadership became a topic of discussion in the corporate, academic, or even public realm, militaries have been enamored by leadership (e.g., Sun Tzu, 500 BC)." Leadership and the U. S. military are synonymous; whereas leadership is stressed and developed through challenging assignment, competitive peer-group evaluations, and continuous emphasis on education and training (Wong, et al. 2003). The challenge of leadership for the U.S. military, and for the medical departments of the armed forces in particular is exceptional (Hesselbein, Cavanagh, Shinseki, 2004). Hesselbein, et al. (2004) explain how an immense reduction in force size still requires the type of leadership that can complete the mission. In addition, Gordon (1997) explains that military medicine must "do more with less," which means medical leaders must succeed even thought they face budgetary cuts and a shortage of trained medical personnel. Military medicine training facilities have been hit extremely hard in recruiting and retaining doctors, nurses, and clinical providers, military medical leaders attribute this challenge to the high deployment tempo in fighting the war on terrorism (Bender, 2005). Unlike medical institutions in other sectors, military leaders must be developed from within, and as pointed out by Hesselbein, et al. (2004), there are no executive search firms to find generals of competing armies to fill vacancies or strengthen skills.

According to Kolenda (2000), the transformation of military medicine involved leaders developing and using technological innovations to enhance their efficiency in a smaller force. Through innovations in technology, military medicine can contribute to the growth of leadership by providing internal and external education development (Chaffee & Mills, 2001).

The Office of the Deputy Under Secretary of Defense for readiness (1996) notes current challenges facing military medicine training:

1. Medical workspaces have become inundated with technological advances over the past two decades. In order to remain competitive and competent, health care workers must become technological literate.

2. Technology advances are meant to reduce the number of humans required to operate equipment, thus diminishing human intervention. However, Fletcher (1990) found that

the demand for highly trained technical personnel has increased tremendously in all branches of the military service.

3. According to Hilty, Benjamin, Briscoe, Hales, Boland, Luo, Chan, Kennedy, Karlinsky, Gordon, Yellowlees, & Yager (2006), the cost to conduct training in the military has risen; “many academic institutions have limited resources, change missions, and skew priorities toward revenue” (p. 446).

In addition, many medical schools have increased their faculty size but have discovered that fewer are actually on hand to teach or practice medicine due to clinical and administrative obligations. In the military environment as well as the civilian sector, “faculty report too many demands on their time and view technology as another problem or budgetary item rather than as help. A lack of computer literacy in leadership, changes in technology, and fear of technology itself are also barriers” (Hilty, et al., 2006, p. 446).

Several researchers (Gjerde, Pipas, & Russell, 2004; Hilty et al., 2006) point out that “most medical schools do not teach technology directly or assess its use, despite recommendations from the Association of American Medical Colleges (AAMC), Medical School Objectives Project (MSOP), and the General Professional Education of Physicians (GPEP)” (p. S68). Additionally, Kirby (1987) explain that schools are focusing on other important items that future clinical students need to know. Furthermore, Hilty, et al. (2006) argue that “they are quick to determine whether a student will require summer training before school to satisfy prerequisites. Some schools “add on” a technology courses but do not integrate the technology into the curriculum” (p. 445).

Program directors, teaching staff, and medical school administrators have a common duty to educate its students beyond curriculum materials, but to expose them to technologies within their field of study (Hilty, et al., 2006). Although technology introduces these challenges, it may be the instrument to solve many far more complicated concerns. Gradually more, medical school training facilities in both the military and civilian sector are making use of technology to assist with portions of their regular curriculum (Shortliffe, 1999).

Chapter Summary

Advances in technology have created a number of challenges and opportunities for educators in many settings. Both civilian and military education involved in training programs have benefited from technological interaction between students and instructors. But research as noted in this literature review has indicated that much has to be learned about how and in what way instructional technologies can enhance the learning process for medical students including military trained medical personnel.

Leaders involved in educational programs such as clinical training usually are transformational or transactional types of leaders. These types of leaders according to Bass & Avolio (1997), represents active, positive forms of leadership whose behaviors are needed for effective department management.

With the shifting sands of technological changes in medicine, leaders must be proactive in integrating these changes into medical education and training programs. Future growth and development of medical trained students depend on the current actions of program leaders; any lack of preparation by leadership can hinder student's intellectual and clinical skills and impact their readiness as health care providers.

Since the 1900s, a recurring pattern of expectations and outcome has been anticipated for improving instructional practices. Technology should not be considered a miracle tool that can erase educational problems overnight; rather technology should be viewed as a tool that can be integrated into an existing education program to complement leadership strategies on enhancing student's knowledge of medical instructions.

When using technology to enhance instruction, it must be clear that technology cannot replace the human factor in education. All stakeholders must be prepared to be motivators, leaders, and managers of a process and implementation. Most of all, educators involved in instructional technology use must have a fundamental understanding of the technology they are using in order to make decisions and prevent problems before they develop. All stakeholders in the leadership chain-of-command must work together to analyze, design, develop, implement, and most of all evaluate programs that provide the upmost quality of instruction through the use of technology.

CHAPTER III: RESEARCH DESIGN AND METHOD

Overview of the Case Study

The purpose of this chapter is to describe the research method used in this descriptive case study. A review of the literature pertaining to the adoption of instructional technology by faculty members reveals that much of the emphasis has been placed on attitudes of leadership, time factors, availability of hardware, software issues, faculty attitudes, personal familiarity with technology, and training. However, military training organizations have not been studied as extensively as education, business, and government. This chapter describes the research design and method, including approach, sample, and data-collection instruments used in this study.

Purpose of the Study

The purpose of this study was to examine the adoption of instructional technology by faculty members at a military medical education program (Interservice Physician Assistant Program – IPAP) during the previous two years. Within the case study, factors that facilitated or inhibited the adoption of instructional technology were examined. Additionally, IPAP program leadership behaviors were examined to describe their association with faculty member's adoption of instructional technology.

Research Design: A Descriptive Case Study

Stake (1995) defined a case study as "the sequence in which the researcher explores in depth a program, an event, an activity, a process, or one or more individuals" (p. 443). Burns and Grove (1993) define 'descriptive research' as a process of obtaining rich, thick information pertaining to a particular phenomenon. Polit and Hungler (1995) noted that a descriptive study focuses on interviews, document analysis, and observation of a particular phenomenon as sources of data.

A case study is ideal for this research because it provides an analysis of an exclusive training environment that is unique to the military: the only military physician assistant training program in the United States. For this reason, a case study provided structure for examining and describing the evolution of instructional technology at the IPAP, factors that facilitated or inhibited instructional technology adoption by faculty members, and the perceived influence of leadership behaviors on this process.

Research Questions

The following questions guided this case study:

1. What factors inhibited or facilitated the adoption of instructional technology at the IPAP?
2. How has instructional technology evolved over the last two years at the IPAP?
3. What is the role of program leaders in the integration and adoption of instructional technologies as perceived by IPAP faculty members?

The results from these research questions provided insight into the adoption of instructional technology in a unique setting. Additionally, personnel placed in similar education and training leadership positions may better understand the influence that their behavior has on faculty members adopting and integration instructional technology.

Procedure

This section provides a description for the method of the study and the rationale for the research design, offering a description of data collection instrumentation and procedures, interviews, personal documents, and observations. Additionally, factors associated with the substantiation of research credibility and dependability were addressed.

Assumptions and Rationale for a Qualitative Design

According to Yin (2009), a descriptive case study design is used “to describe an intervention and the real-life context in which it occurred” (p. 20). Since this study focused on a particular military medical training program, a rich and thick description of the phenomenon pertaining to the adoption of instructional technology by faculty members was examined. This research design allowed a methodical examination of the IPAP within its natural environment. Additionally, this case study captured the essence of the program through the voices of those who participates directly in the implementation of instructional technology.

Weiss (1998) maintained that qualitative research designs allow for greater understanding of developments in a program or process as it evolves. Moreover, qualitative research provides an awareness of time and history of a particular program and offers a personal perspective from program participants.

The Researcher’s Role

Patton (2002) notes that the credibility of the researcher depends on “training, experience, track record, status, and presentation of self” (p. 571). He points out that familiarity of the researcher with the content of a study is necessary because qualifications, experience, and reflexivity create confidence in the data. As a United States naval officer, physician assistant, adjunct assistant professor of health care sciences, and former student of the Interservice Physician Assistant Program, the researcher has been involved in many management decisions regarding implementing new technologies into a training program. The researcher has over 29 years of military experience, and has held several leadership positions exclusive to military medical education and training. While serving as an educator and clinician during this period, the researcher's duties included teaching, curriculum development, faculty development, and evaluation and assessment of instructional technologies in healthcare training. These life experiences can help provide insight into what participants are describing based on similar experiences. Moreover, Corbin and Strauss (2008) suggest that similar life experiences help to establish credibility with participants.

In addition, the role of the researcher is to identify and separate any personal biases that can influence the collection, management, and interpretation of data (Corbin & Strauss, 2008). Therefore, recognizing the consistency of data sources between participants and researchers through triangulating techniques controlled for bias and added to credibility. Also, the researcher provided participants with transcripts of interview sessions to check for accuracy. A committee member who also served as a research advisor, offered guidance on the formats for examining and analyzing the large amount of collected data and the coding and categorizing of the emerging themes. The research advisor also verified the data management and coding process.

The case study was documented so that each procedure could be reviewed for consistency and bias. During the analysis process, the researcher conducted a careful examination of the relation between the collected data and the finding to see if the analysis procedures made sense, and if the findings reflect the nature of the phenomenon being studied.

Gaining Access and Entry

As a military physician assistant, the researcher met with the current IPAP program director at the American Academy of Physician Assistant annual conference to request permission to conduct a research study. A request was sent to the program director to use his training site for graduate research. The program director was informed that due to the uniqueness of the IPAP, it would be an ideal location for collecting research data on investigating the perceived influence leadership behaviors may have on the adoption of instructional technology by faculty members. A key factor in selecting participants from this location was the accessibility to faculty members who were willing to provide information and shed light on specific phenomena exclusive to military medical training. The program director provided a general description of the staffing size, leadership, and organizational composition of this facility (see Appendix L).

Permission was granted in June 2009 by the program director without the need for expanded procedural requests (see Appendix F). Since the IPAP program is in transition of improving their technology infrastructure, this topic will contribute to the evolution as well as to all participants involved in this study.

Description of the Case Study Site

The site for this research is a military medical training facility that was established to train military and federal physician assistants. This study was conducted at the Interservice Physician Assistant Program (IPAP) which is located at the Academy of Health Sciences, Army Medical Department Center and School on Fort Sam Houston, in San Antonio, Texas. Annually, the program trains 180 to 240 students with approximately 30 full-time faculty members' (IPAP Web Bulletin, 2004). According to Darnall (2009), "the student-to-faculty ratio is seven students per instructor, which provides close supervision in labs and individual attention as indicated" (¶ 5). The program curriculum is designed to educate students on current medical education advances and to develop clinical problem solving skills.

The organizational structure (see Appendix L) of the IPAP is briefly described:

1. Program Leaders

    a. Program Director: is a physician assistant normally holding the military rank of O-6, whose administrative duties may include but not limited to providing leadership and coordination to faculty and students, budget management, planning and analysis for the growth and development of a program.

    b. Medical Director: is a licensed physician normally holding the military rank of O-5 or above, with previous experience working with or supervising primary care PAs. Some of the administrative duties include analyzing requirements of PA training; ensuring that course curricula provide basic sciences skills, didactic clinical instruction, and proper physical examination skills.

    c. Academic Coordinator: is a certified physician assistant (civilian instructor) who is knowledgeable in development of learning objectives and curriculum development.

    d. Clinical Coordinator: must be a certified physician assistant and hold the rank of O-5 with clinical coordinator experience. Duties include coordinating clinical training and related issues with the second year clinical training sites of each branch of service.

    e. Senior Service Representative: is a senior faculty member by data of rank for each service (Air Force, Army, Coast Guard, and Navy). Duties include being a voting member of the Executive plus Committee.

2. Faculty Positions

    a. Faculty Class Advisors: are members of the IPAP teaching staff who supervise students and oversee administrative concerns of students assigned under them.
    b. Instructor: each instructor holds a Master's Degree and has clinical experience in their related field of instruction.

Participant Selection

A purposeful sampling strategy was used to identify participants for this study. Patton (2002) describes purposeful sampling as selecting subjects based on certain characteristics. According to Creswell (2007), the concept of purposeful sampling is useful in qualitative studies because the researcher can select individuals and sites for the study that "purposefully inform an understanding of the research problem and central phenomenon in the study" (p. 125). The participants were program leaders and faculty members from the IPAP.

Due to the total faculty size of 27, maximum variation sampling was used to purposefully select faculty participants. According to Merriam (2009), this method uses a wide range of purposefully selected individuals. Merriam (2009) defines maximum variation sampling as purposefully selecting participants "who represent the widest possible range of the characteristics of interest for the study" (p. 79). In this study, participants were selected based on a variety of characteristics such as age, gender, military branch of service, educational level, years assigned at the IPAP, and availability and participant choice. The selected participant's met the goal of representing a wide range of diversity and faculty experiences at the IPAP.

A matrix of characteristics was used to gather as much variance as possible. As participants were selected, their particular characteristics were entered into the matrix (see

Appendix K). When all the cells were filled in the matrix, sampling ceased. This method of selecting participants provided variation within the group as well as a range of different experiences. The criteria for completing the matrix included (a) selecting participants in the study that reflected the age groups occupied by the general population of the instructors (b) selecting participants that reflected both genders proportional to the general population of the instructors, (c) selecting military and civilian equivalent faculty members that represented a wide range of experience as instructors at the IPAP, (d) selecting participants that reflected the various educational levels occupied by the general population of instructors, and (e) selecting participants assigned at the IPAP for 2 or more years that could provide an historical prospective of the progression of instructional technology at the IPAP.

The demographic profile of the typical IPAP faculty member is a well-educated, midcareer military officer of various ethnicities and genders. Virtually all faculty members are career military officers or civilian employees in the Department of Defense, who have the professional knowledge and experience to provide meaningful data for this study.

Data Collection Instruments

Multiple methods were used to collect data on the following phenomena: (a) the evolution of instructional technology over the last two years at the IPAP, (b) factors that inhibit or facilitate the adoption of instructional technology at the IPAP, and (c) the type of perceived leadership behaviors related to the adoption of instructional technology at the IPAP.

Data was collected from December 2009 through March 2010 using the following instruments:

1. Program Leaders Interview Protocol (see Appendix A) including demographic information.
2. Faculty Members Interview Protocol (see Appendix B) including demographic information.
3. Classroom Observation Guide, designed to examine the level of instructional technology use by faculty members (see Appendix C).
4. Document Analysis Form (see Appendix D)

Interview Protocols

Themes that emerged from the literature review were used to draft open-ended interview questions for the program leaders. The interview questions were narrowed to nine open-ended questions, and five demographic related responses. Samples from this instrument are “Have you received any suggestions from faculty members regarding implementing technology? If so, were those suggestions put into practice for integrating technologies”? And “In what ways does the administration support faculty members in their use of instructional technologies”?

The refinement process further involved trial interviews with six colleagues who have worked in military medical training facilities within the last five years. These colleagues provided constructive feedback pertaining to clarity of protocol questions which allowed revision of the draft protocols accordingly. The protocols were refined to ensure that each question accurately gathers information related to one of the research questions on the study.

Similar to the program leader’s interview protocol, the faculty member’s protocol was designed to elicit how faculty members perceived instructional technology adoption at the IPAP.

The faculty interview protocol is comprised of eleven open-ended questions, and five demographic related responses. Samples from this instrument are “What role do program leaders play in facilitating faculty member’s integration of instructional technologies? And “How satisfied are you with the current level of involvement by program leaders in supporting faculty member’s use of innovative technologies for teaching”?

After both protocol instruments were refined using the same pilot-testing methods used for the program leader protocol, the protocols were finalized and ready to guide the interviews of selected program leaders and faculty members of the IPAP. The instruments were used to elicit information from participants who can explain perspectives associated with their experiences of adoption or rejection of instructional technologies. Unlike structured interviews which are planned and controlled in advance, semi-structured interviews, as described by Wengraf (2001), are open enough to allow subsequent questions that cannot be predicted. Furthermore, semi-structures interviews with open-ended questions provide richer answers from interviewees (Bernard, 2002).

Classroom Observation Guide

A classroom observation guide was used as a tool for focused observation of instructional technology integration and adoption by faculty members (see Appendix C). This guide was developed in collaboration with a professor of educational administration from Virginia Tech. It was pilot tested by the researcher who observed the use of instructional technology by faculty at the Uniformed Services University of the Health Sciences (USUHS), School of Medicine. Using the guide, the researcher documented who is present during the observation, what the environment and teaching resources were like, and what teaching and learning processes occurred specific to technology use. The observation guide was refined to ensure that each item accurately gathered information related to the research questions of the study.

Following refinement and finalization of the observation guide, the researcher was able to collect data by annotating the observed presence and use of various technologies within the IPAP. The guide is designed to allow for detailed descriptions of various technologies commonly found in advanced medical training facilities. The guide is arranged to assess for the following components: (a) description of the instructional area(s) that provides the content for the training, (b) description of the duration of time technology is used during an observed lesson, (c) description of the type of technology used during an observed lesson, (d) description of how faculty members gain access to technology, and (e) description of how the classrooms and clinical examination rooms are organized for technology use. The data collected from the guide was used to describe the settings in which instructional technology is being used by faculty. For example, the researcher was able to observe a particular type of instructional technology being used by faculty members who stated earlier during interviews that they routinely used that particular technology for teaching. Documenting these observations via written or recorded field notes provided "raw data from which a study's findings eventually emerge" (Merriam, 2009, p. 128).

Document Analysis Form

The document analysis form was used to document field notes findings from reviewed IPAP documents (see Appendix D). The researcher pilot tested this instrument by examining various training documents from the Navy Medical and Education and Training Command. The pilot test involved the researcher using the document analysis form to critically examine documents such as syllabus, assignments, manuals, and lecture notes. Revisions were made to the form to ensure that each item accurately gathers information related to one of the research questions in this study.

The form is arranged so that assess the following components: (a) date document received, (b) source and type of document (written documents, training manuals, newsletters, organizational memorabilia, and course syllabus, (c) creator of document, (d) date document was written or prepared, (e) overview of document contents (describe what the document is about and areas covered), (f) document facts & issues (what relevant facts can the researcher gain from this document), (g) potential benefit of document (what is the value of this document to the case study), (h) potential bias of document (limitations, bias, potential prejudice of this document to the case study), (i) researcher inferences from this document (what conclusions can the researcher gain from the document), and (j) additional comments.

During analysis, the researcher reviewed documents to find out how IPAP personnel are using instructional technologies. The researcher examined trends, patterns, and consistency of documents related to instructional technology adoption.

Data Collection Procedures

According to Merriam (2009), data collection and analysis are conducted simultaneous in qualitative research. That is, “analysis begins with the first interview, the first observation, and the first document read” (p. 165). This case study borrowed coding schemes from the grounded theory approach. Constant comparison methods were used to analyze data from the multiple sources (in-depth individual interviews, personal documents and artifacts, and observations). Glaser and Strauss (1967) describe grounded theory as a qualitative approach that generates theory from observing common experiences in the world of individuals. Merriam (2009) describe the constant comparison method of analyzing data as "comparing one segment of data with another to determine similarities and differences" (p. 30). This section describes the steps involved in collecting and analyzing each form of data source in this study (interviews, observation, and documents).

Interview Data Collection

Interview protocols were used for both program leaders (see Appendix A), and faculty members (see Appendix B). Face-to-face interviews were conducted using these instruments to elicit information from participants relating to their perspective on the adoption of instructional technology by faculty members. These semi-structured interviews consisted of open-ended questions that elicited rich and detailed experiences from IPAP staff. The protocol also provided the researcher the ability to probe and explore within predetermined inquiry areas, thus allowing the researcher more flexibility to explore emerging issues. Additionally, the protocol forms contained a short demographic section that ask for age, gender, education level, military/civilian rank, and years assigned at the IPAP. The interviews lasted between 25 to 45 minutes. During the interview process, the researcher actively listened while maintaining awareness of verbal and non-verbal cues of the participant (Lincoln & Guba, 1985). Formal notes on these non-verbal cues were annotated by the researcher as field notes and were included as collected data for analysis.

Prior to the interviews, each participant was provided a package containing a cover letter (Appendix G), which described preliminary information, on the purpose of the study. In addition, the Institutional Review Board (IRB) informed consent release forms (Appendix H and I) were explained to each participant by the researcher. Each subject had an opportunity to read the consent form and acknowledge their understanding and agreement to participate in the study.

Once participants were fully apprised of the purpose, procedures, and proposed use of the data collected, signed the consent form.

Interviews in this case study were digitally recorded with the permission of the participants and transcribed by the researcher. Justification for using a digital recorders rather than an analog recorder is that digital recorders are considered more reliable and are capable of recording many hours without having to change tapes or batteries (Bernard, 2006).

Observation Data Collection

In this study, the purpose of field observation was to verify what participants told the researcher during earlier interviews about their implementation of instructional technologies. In addition, this form of data collection helped the researcher record the actions of participants in their natural surroundings such as teaching or demonstrating a clinical skill to students. Patton (2002) describes observational data as a method of providing descriptive data in research findings. For this study, the researcher completed a classroom observation guide at specific locations throughout program. The areas of observation interest were the three main physician assistants' classrooms (Appendix M) and the three physical examination clinical classrooms (Appendix O).

The researcher was visible at all times when conducting observations of the instructional and clinical classrooms. However, the researcher made an effort to observe daily activities as a bystander and attempted not to interact with participants' daily routines. During classroom observations, the researcher occupied a workstation located in the back of the classroom that had a good view of instructors, students, and various technology equipments. The design of the physical examination clinical classrooms (three inner-connected clinical examination rooms) required the researcher to walk through and observe each connected room. During class gatherings, the researcher sat at a desk (chosen randomly), and took field notes using the observation guide to observe faculty members interactions with instructional technologies. Each observation lasted a class session-break period which was approximately 55 to 90 minutes. Three instructional classroom sessions and two clinical classroom sessions provided the researcher with sufficient observational data.

Throughout the observation process, the researcher constantly typed field notes using Microsoft Words on a laptop computer. Afterwards, the researcher transferred the field notes to a desktop computer with NVivo software for later data analysis. Additionally, a digital camera was used during field observations to assist in collecting rich and thick descriptive data. In addition, the researcher used a journal to document additional observations and revelations, thus maintaining an audit trail to substantiate trustworthiness (Creswell, 2007).

Documents and Artifacts Data Collection

According to Merriam (2009), "personal documents are a reliable source of data concerning a person's attitudes, belief, and views of the world" (p. 43). Conversely, Merriam notes that personal document materials can be "highly subjective in that the writer is the only one to select what he or she considers important to record" (p. 143). For this study, numerous documents were collected for review, including but not limited to handouts, training manuals, curriculum guides, syllabus, faculty and students handbooks, emails, memos, and lecture notes. For example, when the clinical coordinator of the IPAP explains that there are procedures in place for identifying and attending to technical issues, the researcher requested a copy of the document that explains the procedure. Additionally, the researcher made careful objective field notes about casual and informal observations and conversations. Immediately following each in-depth interview, the researcher wrote field notes that included full physical descriptions of participants and the interview settings. Moreover, all accounts of participant's mannerism, behavior, exchange of ideas, perceived body language, and gestures were recorded by the researcher in a field notebook and used during the coding process.

Data Analysis

The process of data analysis began by the researcher systematically organizing the large volume of data obtained from interviews, observations, and document analysis. These data sources were systematically analyzed by using grounded theory steps of "open coding, axial coding, and selective coding" (Creswell, 2005, p. 397). As recorded data was collected, they were transcribed into text by the researcher using Microsoft Word software. The text was systematically organized for coding as described by Glaser and Strauss (1967) systematic design for grounded theory. This study used both manual (transcribed hand-typed, field notes, and memos) and computer-assisted qualitative data analysis software (CAQDAS) NVivo 8 to analyze qualitative data in this case study.

In the first phase, the researcher used NVivo 8 to perform the initial coding steps of open coding (labeling data into categories). As data was collected, they were categorized and assigned codes that were relevant to quotes obtained from transcribed interviews. This procedure is considered the iterative process which Vogt (2005) describes as a process of repeating the rounds of analysis to arrive at a progressively better decision or result. Using the iterative process of open coding lead to the refinement of the final coding scheme (Bloomberg & Volpe, 2008).

Axial coding (making links between codes) is the second phase of the iterative process. Strass and Corbin (1998) describe this step as "the process of relating categories to their subcategories" (p. 123). Using the NVivo software, the researcher was able to code around the single 'axis' category of the phenomenon and link other categories to it (Bringer, Johnston, & Brackenridge, 2006).

The third phase of coding consisted of selective coding which involved the researcher sorting through annotated memos and field notes (Strauss & Corbin, 1998). Using the core category of the phenomenon and research questions as a guide, the researcher organized field notes and memos into emerging themes. The NVivo 8 software was used to sort themes alphabetically, by size, by the number of link-nodes (categories), and by the date the node were created or modified (Bringer et al., 2006). Documents created in NVivo were color coded and stored under their particular named category for easy identification and retrieval. From these categories, the researcher analyzed the emerging theory as they evolved from the collected data sources. The researcher systematically analyzed the collected data to search for specific types of categories in axial coding and created diagrams to help illustrate emerging themes. In addition, the researcher constantly compared coding procedures, incidences, and categories to further determine similarities and differences of the collected data (Creswell, 2005).

Utilizing the constant comparative method of data analysis (Strauss & Corbin, 1998), the researcher created and connected categories by continuously comparing analyzed data sources against other categories. For example, as interview responses are read, they were labeled and organized by how they relate to similar responses. The researcher was attentive to special vocabulary used by respondents, which indicated an important topic (Bogdan & Biklen, 1982).

Raw data was constantly compared, coded, and categorized, looking for emerging patterns and themes. NVivo 8 qualitative software was continuously used to assist in mapping out patterns about the collected data.

Data was periodically printed for reading and analysis by the researcher, in search of themes and reduction of unrelated data within the coding system. Denzin and Lincoln (2000) maintain that continuous processing of collected data can help guide the study by eliminating excessive and unnecessary data. The authors state that "the researcher [thus] maintains control rather than drowning in data" (p. 22). Therefore, after each session of data collection, the researcher transcribed field notes from the various data sources. Throughout analysis, the researcher identified theoretical insights and themes that related to the research questions. Specifically, the researcher identified a central emerging theme that served as a theoretical model of the phenomenon being studied (Creswell, 2007).

This case study contained several different data sources (recorded interviews, field observations, organization document analysis, emails, journal field notes, and direct quotes) which provided sufficient research triangulation and ensured that a rich thick overview of the phenomenon was described. Merriam (2009) suggests that researchers use a variety of methods during research to ensure credibility of the research study.

The researcher recognizes that qualitative research is known to be demanding and time consuming, yet the unique characteristics of this case study warrant a qualitative approach. The end results of this type of data analysis yielded rich information that is not as easily obtained necessary from quantitative statistical analysis.

Data Management

Data Protection and Confidentiality

Prior to the start of the study, each participant at the IPAP was assured of confidentiality. Participants' anonymity was carefully managed throughout this study. Pseudonyms were used to conceal the identity of the participants. All participants were given the opportunity to review and reflect their interview transcripts, thus allowing participants an opportunity to reconsider and revise their responses. In addition, no identifying information was sought from a participant that was not necessary for this study. Additional precautions were used by the researcher to prevent collected data information from being inappropriately disclosed. The interview tapes and field notes were stored in a locked storage area.

Human Subjects Protection

Throughout this study the appropriate research conduct and procedures were adhere to based on the rules and standards set by the Institutional Review Board (IRB) at Virginia Polytechnic and State University; see (Appendix E) for IRB approval. The selection process began with each faculty member receiving a package that contained a cover letter (see Appendix G) introducing the researcher and describing the case study. The package also contained a consent form requesting permission from subjects to participate in the study (see Appendix H & I). Moreover, the consent forms provided participants with detailed information concerning anonymity and confidentiality of data collected during this study. Participants were informed that their choice of whether or not to participate did not affect their standing at the IPAP. The researcher reminded participants that they will not be compensated for their participation in this study. Participants were made aware that no potential risks existed while participation in this study.

Data Storage and Record Keeping

An enormous amount of data was accumulated during the preparation of this case study. Data was stored in many forms, such as paper copies, computer files, photos, and digital audio files. For this study, data was transformed into retrievable digital formats for easy retrieval and storage. The electronic digital version of data storage provided a way for the researcher to validate the date and time when data was entered into the study (Lin, 2009).

Data was stored in a secure encrypted file throughout the study. Additionally, transcribed data collected was stored within the NVivo 8 software to help analyze throughout the study. Digital or electronic communications was deleted from computer hard drives and storage media at the conclusion of this study. Collected data such as digital audio recording and field notes were transcribed verbatim by the researcher and entered into databases (Microsoft Access, Excel, Word), and stored in NVivo category files that is related to the coded theme(s).

Data Sharing

The finalized dissertation will be submitted to Virginia Polytechnic Institute and State University, Electronic Thesis and Dissertation (ETD) committee for inclusion into the dissertation achieves. The finalized dissertation will be copyrighted, but will be available to the general public after publication.

Trustworthiness

Guba and Lincoln (1998) described four criteria for evaluating the trustworthiness of qualitative research. The authors explain that credibility, transferability, dependability, and confirmability are the alternative criteria for judging qualitative research. In addition, the authors preferred using terminology that reflects a better description of qualitative research than previous traditional terms such as validity and reliability that are used in quantitative research. The four criteria for evaluating trustworthiness are outlined in the next section, and illustrate how this study incorporated these terms.

Credibility (Validity)

According to Creswell (2005), efforts to establish internal validity in a qualitative study should incorporate triangulation, member checks, and peer examination. Similarly, Guba and Lincoln (1998) had earlier maintained that credibility parallels the criterion of validity in quantitative research concur with Creswell that triangulation, member checks, and peer examination or debriefing enhances the accuracy of the researcher and participants accounts. This study addressed the issue of credibility using triangulation, member checks, and peer examination.

Creswell (2005) describes triangulation as the process of checking different data sources for consistency and accuracy. It provides different ways of looking at the same phenomenon (e.g., program leaders and faculty members), types of data (e.g., interview, observation, and document analysis).

Member checking is used to compare data accuracy by allowing researchers to provide draft findings to participants, and soliciting constructive feedback regarding data accuracy (Creswell, 2005). Ultimately, participants of this study were given a draft of the study to check for any discrepancies in the data. All participants were given the opportunity to review and reflect on their interview transcripts, thus allowing participants an opportunity to check for any discrepancies, revise their responses, or reconsider.

According to Swanson and Holton (2005), peer examination provides additional accuracy and credibility by having colleagues review and make comments on emerging data. This provides alternative views and assists the researcher in remaining open to different opinions pertaining to collected data. An auditor, a committee member whose expertise is statistical analysis, provided guidance on the formats for examining and analyzing the collected data, in addition to offering ideas for coding, categorizing, and develop emerging themes. An external auditor (graduate student/peer debriefer) was used to provide additional review of the data collecting process. Lincoln and Guba (1985) suggest using an auditor that has little or no ties to the study, thus reducing internal bias. Additionally, a peer debriefer assisted in reviewing collected data for accuracy, plus interpretations of documents to confirm plausibility and rationality. Creswell (2007) describes the process of comparing emerging categories as the constant comparative method of data analysis. Throughout data collection in this study, each step and procedure was meticulously documented for review to ensure consistency and non-bias.

Dependability

According to Lincoln and Guba (1985), dependability is comparable to the term reliability in quantitative research. The authors explain that dependability refers to whether or not the results of the study are stable over time and across researchers. To address dependability, the researcher used a peer debriefer to examine collected data and provide feedback on clarity of the research plan and its potential for consistency over time and across researchers.

Confirmability

Bradley (1993) described confirmability as "the extent to which the characteristics of the data, as posited by the researcher, can be confirmed by others who read or review the results" (p. 437). As suggested by Guba and Lincoln (1998), researchers can simultaneously account for confirmability and dependability by using an audit trail.

Transferability

According to Schram (2003), transferability refers to the ability of other researchers to apply the finding of a particular study to their own. To provide for transferability, the researcher of this study provided a thick, rich description of the contexts, perspectives, and findings that pertain to the experiences of IPAP faculty members. The researcher also provided sufficient information to allow the reader to decide whether the findings are applicable to their research (Lincoln & Guba, 1985).

Chapter Summary

This chapter provided information on the research methodology, sampling instruments, procedures (interviews, observations, and documents), and data management and analysis that were used to conduct this qualitative study. The objective is to identify central themes and categories from this data in order to provide a rich description of the factors that facilitate or inhibit the adoption of instructional technology by faculty members. To ensure trustworthiness of the findings, the researcher was attentive to collecting data, developing themes, coding, and interpretation of results. Additionally, data was analyzed using the constant comparative method (Corbin & Strauss, 2008; Glaser & Strauss, 1967) whereas each "segment of data is compared with another to determine similarities and differences" (Merriam, 2009, p. 30). Through careful data preparation, the results can provide a thick description of this particular phenomenon, which is unique to this military medical training environment.

CHAPTER IV: FINDINGS

The purpose of this study was to examine the adoption of instructional technology by faculty members at a military medical education program (Interservice Physician Assistant Program – IPAP) during the preceding two years. Within the case study, factors that facilitated or inhibited the adoption of instructional technology were examined. Additionally, IPAP program leadership behaviors were examined to describe their association with faculty members' adoption of instructional technology.

This research used the grounded theory qualitative method which, according to Glaser and Corbin (1967), is an approach that develops a theory deductively from data. This method of analysis provided a thorough examination of the personal experiences of IPAP faculty members. The data was coded, analyzed, and organized first by research questions and then by categories and subcategories using the constant comparative method of qualitative analysis. The study was guided by the following three research questions:

1. What factors inhibited or facilitated the adoption of instructional technology at the IPAP?
2. How has instructional technology evolved over the last two years at the IPAP?
3. What is the role of program leaders in the integration and adoption of instructional technologies as perceived by IPAP faculty members?

The findings are organized in the following order. An overview of the organization is introduced first, and then characteristics of the participants followed by each participant's profile. The next sections focus on resulting themes and categories, findings of factors that create barriers to the adoption of instructional technology and analysis of findings. The chapter concludes with the researcher reexamining the delimitations and limitations, which were identified in chapter 1.

Organizational Overview

Interservice Physician Assistant Program (IPAP) is located on the Fort Sam Houston Army Installation northeast of downtown San Antonio. In 1971 the United States Congress authorized the Army to train physician assistants, and the first Army physician assistant graduated from Fort Sam Houston (SAPA, 1997). In 1996 Fort Sam Houston was selected as the site for military personnel from each branch of service to be trained as physician assistants. The PA training program became known as the Interservice Physician Assistant Program (IPAP). Since 1996 the IPAP has been located within the U.S. Army Medical Department Center and School (AMEDDC&S). The AMEDDC&S occupies over 300 buildings and is the largest health care training center in the world (SAPA, 1997).

The U.S. Army was the first branch of the armed forces to have a program director manage the program starting in 1996. The subsequent program directors represented each branch of service: Army, Air Force, and Navy. The current program director is an Army Colonel and has been a strong advocate for integrating new forms of instructional technology into the IPAP. His vision for change centers on the IPAP becoming a paperless teaching and learning environment. Several participants including the current program director pointed out that over the last 2 years technology has created significant opportunities for the program to become more efficient in the way course materials is delivered to its students. Some examples included moving seventy percent of Phase 1 material to *Blackboard*, using more mannequin simulators, web-based testing software, and interactive computerized whiteboards and podiums.

When asked to describe the current status of technology used for instruction at the IPAP, the program director revealed that integrating and implementing new technology is a complex process. He described how difficult it has been to implement technological changes over the last two years and how only a few of his faculty members have adopted technology change while many others have been resistant to change. *"They are being dragged kicking and screaming, I can count on one hand those that have readily accepted instructional technology changes and have gone on to learn more about it. The rest of them are being forced to um…to cooperate."* Over the last two years the demands for change related to integrating new forms of instructional technologies has created a wide range of emotional shifts for faculty members. Some have expressed pleasure in moving forward with technology, while others have expressed resistance, frustration, and feeling pressured to make changes to something that is not broken.

Over ninety percent of the IPAP faculty members have graduate or higher degrees and approximately seventy percent are military personnel. The remaining faculty members are government civilian service employees in the pay grade of GS (General Schedule) 12 through 14. All are highly motivated and committed to the program maintaining its high ranking status among U.S. physician assistant programs. One major issue that separates this program from other PA programs is faculty turnover, particularly among military personnel. The findings from this study suggest that faculty turnover has been costly to continuity and interrupts course adaptation, redevelopment, and training. This constant turnover of military personnel due to routine transfers every 3 years and retirements has added to the stressors of change.

Characteristics of the Participants

This chapter introduces the 15 staff members who participated in this study, their characteristics and profile, and presents the findings regarding the adoption of instructional technology by faculty members at a military medical education program (Interservice Physician Assistant Program – IPAP) during the preceding two years. The findings presented in this section address factors perceived by staff members as facilitating and inhibiting the adoption of instructional technology at the IPAP. A profile of each participant is presented to provide a description of the experience of these individuals. Fifteen individual interviews were conducted from a staff of twenty-seven.

The sample of IPAP faculty members who participated in this study consisted of 12 men and 3 women. The mean age of the participants was 45, with the youngest being 31 and the oldest being 60. Their length of experience as a faculty member at the IPAP ranged from four months to eight years with a mean of 2.5 years and a total of 37.2 years. Table 2 on the following page summarizes the demographic information of the participants.

Table 2

Summary of IPAP Participants' Demographic Descriptions

Sex	M = 12 F = 3
Age	25 – 34 yrs = 1 35 – 44 yrs = 6 45 – 54 yrs = 7 55 – 64 yrs = 1
Education	Masters = 12 Doctorate or Professional = 1 Other = 2 (Medical Doctor = 1) (Some College = 1)
Years at IPAP	Two or more years = 9 Two or less years = 6
Branch of Service	United States Army = 8 Civil Service = 3 United States Navy = 2 United States Air Force = 1 United States Coast Guard = 1
Rank	O3 – O4 = 9 O5 – O6 = 2 GS10-GS12 = 2 GS13 – GS15 = 1 E6 – E9 = 1

Participant Profiles

Profiles of the participants are presented to provide a description of their role as an IPAP faculty member and experience or comfort level with instructional technology. The profiles are presented in the order that interviews were held.

Participant 1

P1 is a Major in the United States Army and is one of five medical officers (doctors) assigned to the IPAP. He provides training to physician assistant students on the subject of neurology. He has been assigned at the IPAP for 1.5 years. P1 describes himself as a frequent user of instructional technologies. He explained that during his time at the IPAP he has used *PowerPoint, Blackboard,* and Smartboard, and looks forward to using the Personal Response System (PRS) clickers (electronic device that allows students the capability to interact and answer questions electronically in a classroom environment) when they become available.

Participant 2

P2 holds the rank of Major in the United States Army and is a Physician Assistant. He has been assigned to the IPAP for only four months and provides training to freshman (1st trimester) physician assistant students. P2 has two master's degrees, one in education and the other in physician assistant studies. He describes himself as a casual user of instructional technology. He explained that he became familiar with *Blackboard* during his time as a graduate student a year ago, but seldom uses any other technology besides PowerPoint. He also explained that, for him, age (between 45 and 54) is a barrier in that he prefers to use paper over digital and virtual technologies, although he acknowledges that while assigned at the IPAP he would like to do more with technology.

Participant 3

P3 is a United States Army Physician Assistant who holds the rank of Major. He has been assigned to the IPAP for 19 months and teaches hematology and medical history to the senior (3^{rd} trimester) physician assistant students. P3 holds a master's degree in education and considers himself an average user of instructional technology. He notes his initial understanding of some technologies is that of a typical user. He describes himself as an advocate for integrating instructional technology into his curriculum and believes that some of the problems hindering the transition of integration stems from fear of change. P3 explains that "push back comes from people that I think are technological phobic."

Participant 4

P4 has more than 12 years experience as a physician assistant and has twenty plus years in training and education of military healthcare professionals. He is a Lieutenant Commander in the United States Navy, and has been assigned as a faculty member of the IPAP for three years. Serving as the primary instructor of physical examination, P3 describes himself as a frequent user of instructional technology-- he notes constantly using audiovisual technology in his PowerPoint slides to demonstrate physical examination techniques and rheumatologic conditions.

Participant 5

P5 is one of the most experienced instructors at the IPAP and is designated as one of the seven program leaders. She is a Colonel in the United States Army and holds the positions of Branch Service Chief and Senior Army Representative. P5 is an Army nurse; she holds a master's degree and has been assigned at the IPAP for 4 years. P5 teaches PA professional issues to students in each trimester of training. As a program leader she is extremely involved in the transition of creating a paperless learning environment at the IPAP and vows that this trimester is the last time she will have handouts printed as hardcopies.

Participant 6

P6 is a Major in the United States Army and has over 12 years experience as a Physician Assistant. At the time of the interview, he had been assigned to the IPAP for three years and three months. He is considered one of the most innovative instructors at the IPAP for the manner in which he incorporates video and sound technology into his pathology lectures.

Participant 7

P7 has over five years combined training and leadership experience at the IPAP. He is a Colonel in the United States Army with over 20 years' experience as a Physician Assistant. He currently holds the leadership position as the program director, his previous tour at the IPAP was that of the academic coordinator. As the program director, P7 has been proactive in advancing the use of instructional technology at the IPAP. During the last two years, he has implemented the use of *Blackboard, My Evaluation.com, Exam Master*, Smart Boards, and the purchase of the Personal Response System (PRS) clickers. P7 points out *"I've supported almost everything that has been brought forward."*

Participant 8

P8 is a United States Coast Guard Physician Assistant who holds the rank of Lieutenant. He has been assigned to the IPAP for 2.5 years and teaches cardiology and electrocardiography to physician assistant students. He is credited with reviving the use of sophisticated mannequin simulators at the IPAP. P8 holds a master's degree in physician assistant studies and frequently-conducts workshops and guest lectures at PA conferences. Although he is one of the most junior officers at the IPAP, P8 is considered a peer informative leader by his colleagues. His knowledge of mannequin simulators' use in medical education has led to some colleagues becoming more familiar with mannequin and incorporating them into their lectures when appropriate.

Participant 9

P9 has more than 20 years' medical education and training experience. He has a combined total of eight years at the IPAP, 4.5 as a United States Army officer and 3.5 as a civil service employee. P9 is currently the Academic Coordinator and teaches dermatology to the physician assistant students. He has a master's degree and is pursuing a doctorate in adult-education. P9 notes that he is an average user of instructional technology and, as one of seven program leaders; he is active in the transition of integrating more instructional technologies into the program.

P9 has been instrumental in the conversion of moving paper produced testing to a digital environment on *Blackboard*. He notes that so far this evolution is still in its infancy and has experienced several hiccups that have slowed the adoption rate by faculty members. P9 expressed this concern by saying, *"I personally used my course and myself as a guinea pig….to show how easy this could be; I've fallen on the grenade for everyone thus far."*

Participant 10

P10 is a Major in the United States Army and is a physician assistant assigned to the IPAP for the last 16 months. He has a master's degree and teaches radiology to physician assistant students. The program director has designated P10 as the subject matter expert of *Blackboard* during the transition of curriculum materials over to the *Blackboard* platform. He is responsible for holding workshops to bring staff members up to a level of comfort with *Blackboard*. P10 is very fluent in computer technology, based on his creation of several time saving Microsoft Access templates and other software transition projects that were adopted by IPAP faculty. His technology expertise was mentioned numerous times during the interview process by every participant. During an interview, the program leader stated, *"If P10 gets ill or decides to retire; I am up the creek without a paddle."*

Participant 11

P11 is a graduate of the IPAP program. She served on active duty in the United States Army as a physician assistant for several years before returning to the IPAP as an instructor for the past 2.5 years. She has a master's and teaches clinical correlations, infectious disease and medical history to physician assistant students. P11 is an average user of instructional technology and has made some efforts to move her lecture materials to the *Blackboard* platform. However, she has voiced some concerns about the future plans of instructional technology at the IPAP, most noticeably infrastructure, training, data security, and backup procedures in case of technology failure.

Participant 12

P12 is one of the junior staff members at the IPAP; however, he has a tremendous amount of responsibility as the Non-commissioned Officer in Charge (NCOIC). P12 is a Sergeant First Class and is in charge of the testing office. He has been assigned at the IPAP for seven months and is responsible for logistics issues such as contacting DOIM (Directorate of Information Management) for technical support of computer issues, purchasing technology hardware and software based on administrative request, reproduction of instructional documents for faculty, and issuing of textbooks and laptops to students. P12 also teaches BLS (Basic Life Support) and intravenous therapy to the physician assistant students.

Participant 13

P13 is a United States Air Force Major who has been assigned at the IPAP for 18 months. She has a master's degree in physician assistant studies and teaches endocrinology to the physician assistant students. Besides holding a faculty instructor position, she is in charge of the faculty development program. According to the IPAP faculty handbook, this position's duties include:

1. Providing formal internship and guidance curriculum to new faculty members assigned to the IPAP.
2. Ensuring that all faculty members have the opportunity to expand their professional teaching skills by ensuring the availability of continuous education and training beyond the "basic instructor" type course.
3. Establishing a peer review program that offers colleagues the opportunity to discuss issues that will promote professional growth and development.
4. Providing training to faculty members that support their ability to give elite professional education to physician assistant students. The faculty development program leader should offer training that ensures faculty members are well trained, highly skilled, and able to function as a qualified instructor in medical education.

P13 describes being comfortable with instructional technologies currently offered at the IPAP, and explains that she is all for integrating new technologies into the program. She further explains that she has placed her lectures, syllabus, and *PowerPoint* slides on *Blackboard*; however, she acknowledges that she has concerns about no backup in case of technology failure.

Participant 14

P14 is a Lieutenant Commander in the United States Navy and has been assigned to the IPAP for 3.5 years. He has a master's degree in physician assistant studies and teaches genitourinary to physician assistant students. He represents the IPAP as the Phase 2 Clinical Coordinator and is a member of the Executive plus Committee at the IPAP. P14 describes himself as a middle of the road instructional technology user but admits, *"I'm a little hesitant, I don't know it but show me and I'll have the hang of it."*

Participant 15

P15 has more than eight years of total instructor experience at the IPAP. He has currently been assigned at the IPAP for three years and spent two years teaching at Texas Tech before returning to the IPAP. He is a retired United States Army physician assistant and is currently assigned as a civil service employee. He has a master's degree and teaches ophthalmology and pulmonary medicine to physician assistant students.

P15 uses instructional technology in his curriculum but to a limited degree. He uses PowerPoint for his lecture slides and uses the "I" drive (virtual drives located on the AMEDD server) to save his lecture instructional data. At the time of the face-to-face interview, P15 had been steadfast in not storing his test materials in a virtual environment until he felt comfortable that all the data security measures had been addressed. During the course of the interviews, he described his apprehension with totally adopting instructional technology into his curriculum.

Resulting Themes and Categories

The common themes discovered during this study became visible in relation to the three research questions: what are factors that inhibited or facilitated the adoption of instructional technology; instructional technology changes that have evolved within the last two years; and what is the role of program leaders in the integration and adoption of instructional technologies as perceived by IPAP faculty members. The common themes identified in this study were internal and external factors that either facilitated or inhibited the adoption rate of instructional technology, the introduction of change and how faculty members cope with technological change, and finally, the role of leadership in the adoption rate of instructional technology. Factors that guided the adoption rate of included organizational factors, personal motivation, and social factors.

Face-to-face interviews coupled with a variety of archival document analysis and field notes of the researcher's observations helped to provide a fuller examination of the research questions. The data presented in this chapter were collected by using the following three strategies:

1. Program leaders' and faculty members' interview protocol (Appendix A and B). The participants were selected by using a purposeful sampling strategy. Maximum variation sampling was used to purposefully select faculty participants, due to the total faculty size of 27. The face-to-face interviews were transcribed and coded using the constant comparative method of qualitative analysis.
2. Document analysis completed on the following documents:

(a) IPAP Faculty Handbook

(b) IPAP Student Handbook

(c) IPAP website

(d) Students Course and Training Modules Handouts

(e) An email pertaining to website training

(f) IPAP training CD-ROMs and DVDs.

3. Observation data collection using a Classroom Observation Guide (Appendix C), field notes, and a digital camera.

By using these research strategies, the researcher was able to achieve a greater understanding of the nature of instructional technology integration in a military medical learning environment. Furthermore, from these data collection strategies, the following five findings emerged:

1. The majority of participants expressed factors that created barriers and influenced their decision to adopt emerging instructional technologies at the IPAP.
2. The overwhelming majority of the participants indicated that over the past two years considerable instructional technological changes have occurred at the IPAP. Slightly less than half of the participants have strong reservations about these changes.
3. A number of participants expressed the need to evaluate current policies on technical support. More than half expressed lack of appropriate support on hardware devices and the majority of participants did not trust the infrastructure to handle the technological changes being implemented into curricula at the IPAP.

4. An overwhelming majority of participants indicated that training or the lack of training on technologies at the IPAP has impacted their decision to adopt emerging instructional technologies. More than half of these same participants noted that some training from colleagues existed but no useful formalized training existed.
5. The majority of participants (14 of 15 [93%]) considered leadership to be favorable toward influencing faculty members to adopt instructional technology at the IPAP. Meaning, participants perceived program leaders as actively seeking ways to employ new instructional technologies into the training program. However, half of the participants felt that factors such as infrastructure, training, time commitment, technology capabilities, and technical support were areas that leadership failed to adequately address before implementing technology use.

The following is a discussion of the findings with details that offer explanation and support to each discovered result. Using rich, detailed, and concrete "thick descriptions" as noted by Denzin and Lincoln (2000), the researcher documented a wide range of experiences from IPAP faculty to provide the reader an opportunity to enter into this study and better understand the reality of the research participants. The researcher used quotations from the interview transcript to report the findings. Using quotes will ensure an accurate description of the experience and perspectives of the IPAP faculty members who participated in this research. Efforts were made to use direct quotes; however, some quotations were edited for clarity and readability. Through the member checking process, each participant was provided an opportunity to review the transcripts of the interview for accuracy. Participants were asked to verify the content in the transcripts and confirm that it is complete and reflects their description of the phenomenon being researched.

Findings of Factors that Facilitated the Adoption Rate of Instructional Technology

Participants in this study described several factors they perceived to be important when considering adopting new technology into their curricula. For example, when asked to respond to the following interview protocol question, "What are the factors that affect your views on using technology as a tool for teaching and learning?" Participants named these factors as being the most important: (a) ease of use, (b) reliability, (c) prior experience with the technology, (d) peer support, and (e) availability of resources.

These factors named by participants were grouped into key categorical factors identified in this case study. These included organizational factors, personal motivation, and social factors.

Organizational Factors

Organizational factors included the following: (a) mandate from program leaders, (b) reward system, (c) compatibility with existing technology, (d) availability of resources, (e) reliability of equipment, (f) funding availability, (g) demands to stay current with technology innovations, and (h) relative advantage over existing teaching methods.

Mandates for adoption.

The IPAP program director mandated paperless testing by the beginning of the next trimester (April 1, 2010). This set timeframe accelerated the adoption rate in a positive way for some participants. However, many participants expressed their frustration with this mandate being implemented so soon without proper support. Besides paperless testing, other program leaders sought to make the majority of their curriculum paperless and available on *Blackboard*; this included digital syllabus, course handouts, and quizzes. For example, P5 pointed out that this was the last trimester that she would print out class materials for students; she declared that everything will be online. According to Rogers (2003), when there is strong resistance to change, leadership may implement scheduled mandates to expedite the adoption rate.

Reward system.

Reward system is a motivator for personnel in any organization, yet in a military organization the weight of a reward system is greatly magnified. Military leaders usually recognize and reward personnel that demonstrate proficiency in their profession. Rewards for both military and civilian's faculty members can be in the form of monetary incentives, awards, citations, or high performance appraisals. Personnel that lack proficiency in certain areas and lag behind their peers can experience career promotional problems. The competitive nature of IPAP faculty member's coupled with peer pressure can influence others to adopt current technology or as a minimum make an effort to learn new technologies.   For example, both military and civilian faculty members can expect resistant to mandated change to affect their performance appraisal if that resistance reduces the readiness, mission, and academic integrity of the program.

Compatibility with existing technology.

The compatibility of technology with current instructional materials was considered an important factor for (4 of 15 [27%]) of participants. For example one participant who has been described as being resistant to change, augured that his time is being wasted transferring his curriculum information to software that is not *Microsoft* compatible. He stated *"I am unable to cut and paste my information to Exam Master, and have to retype everything."* Research by Duxbury and Corbett (1996) found that compatibility with existing technology materials systems is positively associated with technology adoption. In addition, Rogers (2003) augured that compatibility is based on the perceived "existing values, past experiences, and needs of potential adopters," "an innovation can be compatible or incompatible with (a) sociocultural values and beliefs, (b) previously introduced ideas, and/or (c) client needs for the innovation" (p. 240). The researcher found that faculty members began using instructional technologies they found to fit their needs. For example, the Smart Board and the Smart Podium was used extensively by participants 93% who found it easy to incorporate their existing teaching materials into this technology medium.

Availability of resources.

As described in the review of literature, Sumner and Hostetler (1999) found that the availability of physical resources such as equipment and technical support were important factors that influence faculty member's decision to use innovative technologies. Although the availability of technological equipment contributed to an increase adoption rate, factors such as training, infrastructure, equipment reliability, and technical support slowed the rate of adoption for IPAP faculty.

Reliability of equipment.

The participants identified equipment reliability as an essential component when deciding to adopt certain forms of instructional technologies. Technology can have an assortment of intrinsic properties that can break down at any time. IPAP educators explained that they only have a certain amount of time to present their lectures to students and cannot spend time troubleshooting technical problems they may or may not be able to repair. Cuban (1999) asserts that if an educational institution lack reliable technology and support, educators may choose not to use it in their teaching. IPAP educators found that the infrastructure that housed the internet bandwidth at the AMEDD Center and School was too slow to support their demands. During peak teaching periods, the network would run slow causing teaching materials to upload slow or not at all. This unreliability of the network lowered the adoption rate for any technology that relied on the web to be utilized.

Funding availability.

The cost associated with introducing new technology into an organization can instantly become a barrier to its adoption rate. The initial cost associated with changing from one educational instrument to another is usually visited during the planning stage of integrating technology. Program leaders at the IPAP pointed out that budgetary and financial cost associated with integrating new technology is reviewed during E-committee (Executive plus Committee) meetings. According to program leaders, when anticipating purchasing new forms of instructional technologies, the following steps are taken:

1. Instructional technology is introduced to the E-committee.
2. Justification for the new form of technology is introduced to the committee by the faculty members interested in the technology. Justification includes:
   a. Background of technology
   b. Capabilities of the technology
   c. Pros and Cons of acquiring new technology (needs assessment)
   d. Costs to purchase technology
3. Over a brief period of time the committee members considerer the proposal. They consider the following:
   a. Review the program improvement plan already in place and research its future needs.

   b. Develop a vision for the technology plan to see if it fits the needs of the program.
   c. Determine the goals that must be met to reach implementation.
   d. Create steps to implement goals.
4. Budget, Finance, Cost
   a. Plans for inclusion into present or future budget cycle.
   b. The cost of implementation (not sure if a total analysis involving the overall logistical cost is considered at this point)
5. The technology is either approved or rejected.

In this study, several areas concerning cost issues were not clearly defined. For example, an analysis of the costs of current practices, compared to the cost of integrating new technology equipment into the program. Also, exterior costs such as upgrading infrastructure to meet the demands of the new technology, training to educate faculty members on how to use the technology, and technical support to accommodate the new technology. In order to ensure that educational technology will be embraced by faculty members, leadership must make sure that logistical obstacles are addressed prior to technology implementation. According to Grey (2001), support from educational leaders to meet the needs of faculty members is essential. Without the foresight to meet individual needs pertaining to logistical issues, implementation of technology will be diminished.

Demands to stay current with technology innovations.

Medical training facilities are pressured to stay current with the latest advances in medicine in order to remain competitive with other medical training programs. Over the past two years, incorporating emerging instructional technologies into clinical training has placed increased demands on IPAP faculty member's time and teaching methods. Besides the educational institution being pressured to modernize with technology, individuals are pressured to change and stay current with the latest trends in educational technologies. According to McMaster and Wastell (2005), adoption of an innovation is desirable and "failure to adopt is pejoratively portrayed as resistance" (p.385-386). There was no lack of motivation by faculty members to be part of the team and try to use new technologies. The researcher observed that resistance was primarily due to internal and external barriers that interfered with a smooth transition to integrate technological changes.

Relative advantage over existing teaching methods.

Prospective users of technology are those that sense the new technology will give them a relative advantage over its predecessor (Rogers, 2003). Over the past two years, IPAP faculty members adopted instructional technology they felt provided them the opportunity to enhance physician assistants' student's ability to succeed as clinicians. For example, during an interview with the Clinical Coordinator of Phase 2 sites, the researcher asked him, "What are the factors that affect your views on using technology as a tool for teaching and learning?" The coordinator described how using technology that works better than its predecessor was an important factor that influences him to use it. Similarly, the majority of participants described how they would only adapt technology that enhanced their ability to teach students. Participants who felt that the new technology was inferior to what they were previously using expressed their dissatisfaction with that technology.

Personal Motivation

Personal Motivation: With regards to personal motivation, the following factors were found in this study: (a) proficiency in teaching with technology, (b) personal interest and perceived value, (c) trialability, and (d) ease of use and reliability. Many participants described how they were self-motivated to adopt new technologies into their teaching. They described how being proficient with certain technologies has increased their efficiency in the classroom. For example, P8 explained how over the last two years faculty members have embraced new instructional technologies to improve their teaching effectiveness. *"I think we have tremendous opportunities to increase student learning, particularly within advancement of our physical exam labs, due to the addition of Smartboards and Podiums."*

Proficiency with instructional technology.

Proficiency with instructional technology is important to both organizational leadership and faculty members. The researcher observed that faculty members who were resistant or slow to adapt to instructional technology were viewed differently by program leaders than those who embraced technology into their curricula. For example, one program leader described how a faculty member refused to keep track of departmental schedules available on Microsoft Outlook and preferred to use his desk calendar. She described how the faculty member did not make himself available for departmental functions because he did not stay current with scheduling issues posted on Outlook. This lack of technology proficiency could be perceived by leaders as a weakness or deficiency, thus possibly influencing how this individual is judge against his peers.

Personal interest and perceived value.

According to Spotts (1999), the perceived value of a particular technology by faculty members is a key factor in whether they will adopt or reject that technology. Spotts stated that "Technologies that are perceived as improving student learning, enhancing instruction, or making the instructor's job less demanding will be considered by faculty" (p. 97). During the course of this study, the researcher found that many IPAP faculty members primarily adopted instructional technology they found to be valuable to their teaching style. For example, P15 mainly used *PowerPoint* to present his lectures because he perceived it to be easy to use and a useful technology for presenting radiology images. In contrast, he perceived *Blackboard* as being a less effective instructional technology tool for storing and presenting his lectures because of infrastructure, technical support, and training issues that reduced its value.

Many faculties took a personal interest in integrating the PRS (personal response system) because they were involved in the decision process to purchase and implement this technology. Rogers (2003) found that the rate of adoption of a technological innovation occurs much sooner when an individual feels they were part of the decision process. Rogers notes "Innovations requiring an individual-optional innovation-decision are generally adopted more rapidly than when an innovation is adopted by an organization (p. 221).

Trialability.

Several researchers found that trialability is one of the most essential components in the adoption process of innovative technology (Kendall, Tung, Chua, Ng, & Tan, 2001; Rogers, 2003). In this study, trialability is the degree to which innovation may be used on a try-out basis prior to adoption (Rogers, 2003). For example, the researcher found that IPAP faculty members adopted *Exam Master* (an online question database program) after having an opportunity to use it on a trial basis.

Ease of use and reliability.

Ease of use and reliability was described by some participants (5 of the 15 [33%]), as being a prerequisite before consider adopting a new technology. Carr (1999) asserts that, "aversion to risk naturally translates into a need for ease of use and early success if they are to adopt and diffuse the technology" (¶ 32). For example, participant 15 described his struggle and frustration with downloading his PowerPoint slides from a slow *Blackboard* server this way: *"For the first time in ten years of teaching I "flailed" [use the word flailed instead of failed]. "FOR THE FIRST TIME, I WAS UNABLE TO GIVE MY PRESENTATION" [In a concerned but angry voice] "IT WILL NEVER HAPPEN AGAIN" ...because we will have CD disks. And the students will have my presentation…and I will have the capacity to get to it."*

Social Factors

Social factors included the following: (a) peer support and pressure, (b) mentors, (c) enhancing student learning, and (d) increase student interest.

Peer support and pressure.

Peer support and pressure appeared to be factors that contributed to faculty member's use of instructional technology. For example at least three faculty members stood out as subject matter experts with certain technologies (*Blackboard*, *My Evaluation.com*, and *Sim Man*). These experts provided peer training to other faculty members and they stood out as mentors in the eyes of their peers and leaders in the eyes of program leadership. Rogers (2003) found that the viewpoint of peers concerning integrating technology decisions had either a positive or negative influence on individuals. For instance, the researcher observed that faculty members who shared similar belief about *Blackboard* seemed to interact together. Those that felt that this form of instructional technology would interfere with their style of teaching seemed to socialize together more so than faculty who embraced *Blackboard*.

Enhancing students learning and their interest.

The use of electronic technologies by IPAP faculty and students was observed by the researcher. The researcher observed both students and faculty members using electronic technologies such as *Blackboard* and email to communicate. Some participants explained that they adapted to current technologies to keep in touch with their students. Additionally, participants explained that they used instructional technology innovations during lectures to maintain student's interest. In this study faculty decision to use a certain forms of instructional technology was directly tied to how they perceived the technology would improve students' learning. Most noticeably, instructional technology was adopted by IPAP faculty who has or expected to have positive experiences with its use in professional activities, especially teaching.

Table 3

Factors that Influence Faculty Members' Use of Instructional Technology

Factors influencing instructional technology use	
Organizational Factors	
Mandate from leaders	
Reward system	
Proficiency in teaching with technology	(4 of 15 [27%]) of participants indicated that they preferred using technology that is compatible with existing instructional technology.
Compatibility with existing technology	
Availability of resources	
Reliability of equipment	
Funding availability for innovative technologies	
Demands to stay current with instructional technology	
Relative advantage over existing methods	
Personal Motivation	
Proficiency in teaching with technology	
Personal interest and perceived value	(6 of 15 [40%]) indicated that ease of use was a factor in their adoption of technology.
Personal experience with the technology	
Trialability (If I try it, I may like it)	
Ease of use and reliability	
Social Factors	
Peer support and pressure	At least three faculty members stood out as subject matter experts (peer leaders) in supporting new instructional technologies.
Mentors	
Enhancing student learning	
Increase student interest	

Findings of Factors that Create Barriers to the Adoption of Instructional Technology

The majority of participants (9 of 15 [60%]) expressed factors that created barriers and influenced their decision to adopt emerging instructional technologies at the IPAP. Faculty member participants provided clear and direct responses to the interview protocol question, "Describe barriers you believe discourage you from adopting new innovative technology into your curriculum?" These responses fell into the following eight categories: (a) infrastructure including internet and server capabilities, (b) software and hardware issues, (c) technical support with equipment, (d) training and professional development, (e) discomfort with technology, (f) time commitments, (g) financial and budget issues, and (h) leadership role in the adoption of technology.   Table 4 illustrates the frequency or number of times a particular term was mentioned by participants during face-to-face interviews.   The first numbers reflect the amount of times the term was viewed as a barrier to instructional technology adoption. Using NVivo 8, the researcher ran a word query to find terms that occurred repeatedly in the transcripts. Once located, the researcher coded each verbal exchange. The coding was initially performed by NVivo 8 and then manually by the researcher to constantly compare and interpret each reoccurring term for meaning by each participant. While manually coding the data, the researcher analyzed and interpreted the text that described perceived barrier themes pertaining to technology adoption. For example *Blackboard* was mentioned 211 times by participants in the interview transcripts. An analysis and interpretation of the data revealed that the frequency of *Blackboard* being perceived as a barrier occurred 89 times. Consequently, a majority of participants named *Blackboard* as having certain implementation issues (training, ease of use, data security, and infrastructure) that created barriers to adopting this form of instructional technology (see Table 6 page 132).

Table 4

Perceived Factors that Create Barriers to Adoption of Instructional Technologies.

Barriers Category	**Frequency** *(Number of occurrences terms mentioned by participants during interviews)*	**Perceived Barriers** *(Number of times terms described as a barrier)*
Infrastructure	14	12
Software and Hardware Implementation		
• ***Blackboard*** ***(training and technical infrastructure issues)***	**211**	**89**
• **USB (Universal Serial Bus) Security Measures**	2	2
• **SimMan and Harvey Simulators Mannequins**	16	4
• **Students Laptops**	14	10
• **"I" and "G" Virtual Drives**	18	12
Technical Support with Equipment	27	27
• **DOIM (Detachment if Information Management)**	26	21
• **Dedicated Technical Support**	10	9
• **Data Security**	21	20
Training and Faculty Professional Development	**90**	**32**
Discomfort with Technology	12	12
Time Commitments	**81**	**28**
Financial and Budget	32	6
Leadership Role in Instructional Technology Adoption	28	17
* *three most frequently cited barriers by participants during interviews*		

Infrastructure

In this study infrastructure refers to facilities, network, servers, and any other technology equipment that is maintained by the (AMEDD) Army Medical Department Center and School and the University of Nebraska Medical Center that supports the IPAP. The barriers to adoption of instructional technology identified by participants were issues regarding the infrastructure network and server speed and capacity abilities. Some participants (6 of 15 [40%]) described their experience with the technology infrastructure as a barrier. Participant 10 for example, stated the following:

> *The infrastructure doesn't support what we are trying to do. You get different groups doing different things without communicating with each other. So you could have something working one day...life's good. The next day it's not working, and you call your local folks, and they start pointing fingers to somewhere else…and then the next level start pointing fingers to somewhere else, and then they point fingers somewhere else….and then you talk to them and they point the finger back at the original people. You winded up going around in circles. It took three weeks for local folks to find out that someone in Fort Wacouka changed some server setting and didn't bother to let anybody know. And they didn't even know about it….they didn't know that this firewall existed...and so it's a huge challenge here. (Participant 10, January 2010)*

Participant 10 felt that the infrastructure was not sufficient to support the goals of the IPAP. He described the lack of qualified support and the frustration of not being able to find someone that was responsible for providing guidance to technical issues.

Buckenmeyer (2008) pointed out that infrastructure that supports technology must be dependable otherwise faculty members will become frustrated and abandon using the technology that doesn't work properly due to lack of support. Participant 12 describes the importance of having infrastructure that meets the needs of both faculty and students.

> *Well, of the barriers that we are running into right now is trying to ensure that the infrastructure will be able to accommodate us…all of the students….approximately 240 students. Whether the infrastructure will allow that many students to get on the network, and do what they need to do as far as their curriculum is concerned. And it's hard to reach our 100% across the board compliance of allowing students to accomplish their goals; and the goals of the program leaders of becoming paperless if the infrastructure is fragile. (Participant 12, January 2010)*

The technology infrastructure supporting the IPAP was found to presents barriers to instructional technology adoption. The AMEDD Center and School spent millions of dollars over the past two years updating its infrastructure to try to meet the demands of its training programs. However, trying to install fiber optic cables and install other technological upgrade into old buildings with walls made of poured concrete and electrical outlets that were not designed for such installation has been a problem for engineers.

Software and Hardware Implications

For this study software and hardware can be defined as tools used by IPAP faculty and students in the service of teaching and learning. This study found that technologies used for instruction included web-based course management software, testing software, PowerPoint, email, servers, electronic mannequins, and other computer-based technologies used by faculty and students in the service of education.

The overwhelming majority (14 of 15 [93%]) of the participants indicated that over the last two years tremendous instructional technological changes have occurred at the IPAP. Slightly less than half of the participants have strong reservations about these changes.

The most frequent finding that emerged from this study was the acceleration of the use of instructional technology, primarily integration of web-based course management software over the last 2 years. Web-based instructional technologies that have been, initiated and adapted by IPAP faculty members over the last two years include: Software: *Blackboard*, *My Evaluation.com*, and *Exam Master*.

Blackboard

Chapman University (n.d.) describes *Blackboard as "*a web-based course management system" located on a server platform. This software platform is designed to create a medium to maintain instructional materials on an online environment to complement face-to-face teaching. *Blackboard* features an environment for instructors to place their syllabus and handouts on their course site (Blackboard, 2010).

Blackboard was primarily introduced for use in the Phase 2 portion of the Interservice Physician Assistant Program. It was determined that this platform would be a more efficient way to improve communication and share resources between IPAP staff, Phase 2 coordinators at 19 different sites across the United States, and students on clinical rotation also throughout the United States. The IPAP initially used *Blackboard* located on the AMEDD (Army Medical Department) server platform known as AKO (Army Knowledge Online). This server is maintained by the Department of the Army and can be used by every active duty and reserve soldier in the US. As more IPAP faculty members and students begin to use the AMEDD AKO *Blackboard* platform for coursework, some participants (6 of 15 [40%]) found it to be slow and unreliable as cited by the following quotes:

> *The connectively is never good. The speed's not good, I can't run multimedia off of AKO and expect it to work; you know, it already hesitates if I'm running it off of the internet. So anything I can run locally runs much better. (Participant 8, January 2010)*

Participant 8 felt that trying to use *Blackboard* from a web-based server was extremely slow and believed that local hard drives and storage devices would provide faster access to his lecture materials. Participant 11 describes similar sentiments about retrieving *Blackboard* from the web, she notes:

> *Now they want you to go to the AKO thing….if you can ever get to the website at the time you need to; sometimes you can't. And that would be frustrating if you are trying to teach….whereas the 'I' drive… totally*

different….99.9% of the time that thing is right on the money. The 'I' drive was….as opposed to trying the internet and Blackboard when you are trying to do teaching materials for the military system. I don't think its quick enough. (Participant 11, January 2010)

Participant 3 described how the sluggish upload of his PowerPoint slides disrupted the way he is able to teach his hematology course and has increased his workload and stress level.

Because a lot of time you come in and AKO is slow and is not doing what you expected, and if you are dependent upon the speed of that server combined with the speed of my server, either one can be slowed down. If I'm trying to transition slides and it is taking minutes in between, well that's going to screw up the whole class. (Participant 3, January 2010)

The AMEDD AKO *Blackboard* platform was an option agreed upon by the IPAP leadership Executive plus Committee because it was more cost effective to use a system that is already available to the military at no cost. The AMEDD AKO *Blackboard* site is on a secure military web-site that is protected by several layers of firewalls and requires three levels of security to gain access. The IPAP recently purchased a contract with the University of Nebraska Medical Center which is the master's degree granting instruction for the IPAP. According to some faculty members, this site is more stable. Participant 1 described how significant the transition from the AMEDD Blackboard site to the University of Nebraska Medical Center site made toward increase adoption by faculty members:

We have access to the AMEDD Blackboard, but it is a little bit unreliable for our purposes, and UNMC (University of Nebraska Medical Center) is pretty stable. It doesn't crash very often. It is a better version of Blackboard, and since that is who our affiliation is with, we are using it this trimester. We had a lot of problems with the AMEDD Blackboard site. It would go up and down all the time, which was really frustrating. (Participant 1, January 2010)

Participant 7 described how he purchased the rights to use the UNMC *Blackboard* site based on recommendations from faculty members.

Um…the recommendations were that we use the University of Nebraska. I pretty much take all…I depend on my faculty to make recommendations of what they want for technology. So we have to pay extra…a significant amount of money to Nebraska to use their Blackboard. In one since, it's being offered for free here, but we use their Blackboard on the advice….again of it being a more stable platform than Blackboard here at the AMEDD, also I think it's a newer version than what we have here. (Participant 7, January 2010)

My Evaluation.com Software

Another software instructional technology that has been introduced to the IPAP within the last two years is *My Evaluation.com*. This software is used primarily at the Phase 2 clinical sites by preceptors to critique physician assistant students. Although many faculty members are thrilled to have an automated software application that tracks students' progress through the program, some participants (4 of 15 [27%]) voice concerns that its non capability with other Microsoft based software may hinder the adoption rate by faculty. For example, some of the comments cited were those by Participant 9 who said, *"The Air Force says that the server that delivers or holds 'My Evaluation.com' is not on their approved list of servers to use, so they are just not going to use it. So all of our Phase 2 sites in the Air Force are going back to paper,"* and those by Participant 2 who commented, *"My Evaluation.com, it's not the most intuitive of software."* Participant 10 spoke about the difficulty of compatibility between software programs being used by the IPAP. For example he pointed out, *"We are trying to incorporate My Evaluation.com into Blackboard, plus other data that we manage into one common platform. This is going to be a tremendous paradigm shift here. It is painful when you are trying to integrate My Evaluation.com into a military system."* Participant 10 described how the IPAP has to hack through the database to receive *My Evaluation.com* critiques from Phase 2 sites via email. He commented, *"We have to change the file extension in order to ship and receive some files. The idea has been to get rid of all of the superfluous programs and coming down to one program. That's something that was recommended a few weeks ago."* Although some participants positively approved of this software, Participant 14 voiced some aversion about adding another layer of software programs to overworked preceptors in Phase 2:

> *Blackboard doesn't do it all, My Evaluation doesn't do it all, so we got to have two, and that's a problem out at the Phase 2 sites we have a busy clinician, a PA for example, such as the Phase 2 coordinator at the school house in San Diego…I know that you are seeing patients….I know you're*

doing this, you are a great American, but you also have to go into Blackboard every day, and you also have to go into 'My Eval' every day, and you got to extract this, this, and this. And you got to take action on these things. You know, if these systems could talk or if one person did both, you could arguably cut down that workload and time by at least 1/3 by just accessing one data base for everything you need; and then generating emails and phone calls out of that information as opposed to going back and forth. So that's something we need to work on…and hopefully someone will develop something that either will have Blackboard and My Evaluation to synch-up and either share the information or someone comes up with a program that does both of those and substitute those two for one. Ummm, that will be important. (Participant 14, January 2010)

Exam Master

Exam Master is an online question databank purchase by the IPAP within the last two years to help provide their program with a standardized method to prepare tests. *Exam Master* is designed to provide students with numerous practice questions for the curriculum in Phase 1 and Phase 2 as well as preparation questions for the Physician Assistant National Certifying Exam. An overwhelming percentage of participants (12 of 15 [80%]) mentioned *Exam Master* as new software technology being adopted at the IPAP. Participant 14 describes this software as being well received by faculty members, by commenting: *"Exam Master is not what I envisioned, but it has led to an increased quality for testing in Phase 2."*

The following hardware technologies were either introduced or omitted from the IPAP during the last two years: USB, Ultrasound machines, simulator mannequins, Smart Board and Smart Podium, Personal Response System (clickers), student issued lap tops, and the "I" and "G" virtual drives (designated storage space for IPAP individual staff on the server)

Universal Serial Bus (USB) Security Measures

In November 2008, the Department of Defense Strategic Command placed a ban on all USB devices following the discovery of a worm virus that spread through DoD computers via removable drives. The ban covers all forms of USB devices such as thumb drives, memory sticks, memory cards, flash drives, and any removable device requiring USB port connections (McCaney, 2010). Although IPAP faculty members have been able to adapt to this mandatory change, the impact of this decision remains an inconvenience and slows the adoption rate of some instructional technology. A small percentage (2 of 15 [13%]) of participants have described situations where some equipment has been inoperable since this restriction has been imposed. For example, Participant 3 commented, *"It hurts not to be able to plug in devices, I bought a little toy for changing slides remotely [P 3 showing the interviewer a remote control slide advancer] ah, that got shot down because you can't put anything in there anymore."*

Use of Patient Simulator Mannequins

Patient simulators have been available at the IPAP for over two years; however, they were not being used until recently. SimMan was the first patient simulator purchased by the IPAP. It uses pre-programmed scenarios and simulates a patient in distress. Some participants described this technology as being complicated, and for years it was never used. Participant 8 states, "*SimMan got pushed into a closet because it is very difficult to use…you got to program a lot of things….lots of buttons, remote controls, and…and…preprogramming, and all kind of stuff. You have to know algorithm, and that kind of stuff….much better than the student, because you have to be able to work through those algorithms. Students will ping you if you are wrong on them."*

SimMan was seen as a complex piece of instructional technology until recently when Participant 8 discovered its usefulness in his course. He notes, *"We have previously bought simulators and they've been pushed into a closet and never used; so people are hesitant to use them. I mean SimMan sat in a closet for four or five years from the time it was pushed away when one instructor left, until the time that I got here and I said; why is SimMan covered in paint? As you know a $45,000 trauma mannequin, it doesn't make sense."*

Within the last two years, the IPAP has purchased another patient simulator that is being used by more faculty members. During interviews, Participant 7 mentions: "*Other things that we added since I've gotten here in terms of technology, we've added a Harvey Mannequin [a life-sized mannequin created to "help students develop and improve their diagnostic skills in the field of cardiac care"* Harvey Cardiac Patient Simulator, (n.d.)*] it's a simulator. It simulates cardiovascular conditions and findings."* Participant 8 also points out, *"I got Harvey and the nice thing about Harvey is that it is easier than SimMan."*

Smart Board and Smart Podium

Smart Board and Smart Podium instructional technology has recently been introduced within the last two years. The Smart Board is an interactive, electronic whiteboard system which allows faculty members to use the web, preloaded computer software programs, and other electronic media to enhance instruction and learning. The Smart Podium is an adjunct add-on tool that can be used with the Smart Board. IPAP classrooms (see Appendix M, N, and O) have two Smart Boards located in the front of each classroom opposite each other, with the Smart Podium centered between both screens. The researcher observed faculty members continuously using this form of instructional technology to present their lectures during data collection. When asked by the researcher about instructional technology use by participants and their colleagues, Smart Board and Smart Podium were named by (14 of 15 [93%]) as technology they frequently use.

Personal Response System (clickers)

The personal response system (PRS) has been touted as one of the most anticipated instructional technologies being introduced to the IPAP. Over half of the participants (8 of 15 [53%]) mentioned that the PRS can enhance their teaching experience by using interactive technology in such a way that today's students will be more attentive. One of these participants described it in this way:

> *I know currently, the biggest thing that I'm excited about is the Personal Response System (PRS) [clicker], something that might work. Like in my lectures, if I have multiple choice questions come up…I would randomly select a student out of the classroom…and you know, answer this question for me. The Personal Response System is going to give us the opportunity for all students to answer the questions. In a class size of 80 students, you'll getting 80 students to answer the question, rather than just 1. (Participant 6, January 2010)*

Student Issued Laptops

During the initial trimester of PA school, students are issued textbooks, some medical examination supplies, and laptops. During the site visit, the researcher observed the arrival of new Dell Latitude D620 laptops. The administration and support staff are responsible for issuing computers to students, but before they are issued the computers must journey through several steps. First, each student must fill out information that helps to establish an account at DOIM (Directorate of Information Management). This collection of information from the students generates a work order that represents that particular PA class. DOIM receives the work order that will allow each student the ability to log onto their IPAP issued laptop. Second, prior to the student being handed a laptop, another IT department at the AMEDD called G6 must physically put the computer on the network; this step has a relatively quick turnaround time. Third, DOIM receives the work order and turns on the student account. At the time of data collection at the IPAP, some participants (5 of 15 [33%]) described DOIM as a major delay in this process. Participants estimated that the average lag time for DOIM to assign and turn on a password was fewer than ten computers a week. With the average class size being between 65 and 80 students, this could be a major barrier for implementing instructional technology. Two participants conveyed this frustration when they said:

> *Yeah, they are already here [student issued laptops], and now….even after we got them, they still have to go to DOIM to put all this stuff on them. And you know how long that's going to take for 53! About the time we get them, I may be….the class may be finishing the first trimester. Participant 5, January 2010)*

The students have ah…laptops issued, and the move was to get them all laptops so we can do online training, online testing. What happens is that we have connectivity and access issues with the computers, and my greatest fear is, if we move to a 100% standardized online, Blackboard testing, starting in May, we just want be ready. (Participant 14, January 2010)

Fourth, DOIM policy is that any government computer being used at the AMEDD must be accessed via a CAC (Common Access Card), so that no one can just turn on a computer and use it. Besides using the CAC, the computer user must log on with a DOIM issued password. Fifth, the network infrastructure has not been able to support the demands of two to three PA classes (130 to 240 students) using their laptops at the same time. For example, participant 15 described an incident when he tried to have students download his PowerPoint slides:

Infrastructure is very much a barrier….because the wireless works half the time and half the time it don't work. Ah, ah….and not only that….these laptops that they have are rather antiquated they are. And like I said yesterday…I…I…I was watching them…one or two people that got into the site to try to download it and they couldn't download it because it was saying….download...download ….downloading. And 5 minutes later it was still downloading, but it wasn't any downloading going on. (Participant 15, January 2010)

Sixth, many students simply do not bring their IPAP issued laptops to class chiefly because many feel that that is one less thing to lug around campus since they are seldom used during class. Participants described this problem in the following ways:

We are trying to get our students all up on the computers…laptops at one time. We had to tell the students to periodically open up their computers. So if you don't use it and open it up and log in every so often; it will take you out. So once a week our instructors now have to make the students all log into their laptops…and again they have the same problems as we do. Some are [P5 snapped her fingers] up on it, and some just didn't want to deal with it. (Participant 5, January 2010)

As a matter of fact….25% of students don't even use their computers. That was a hiccup in my course the other day, because I made them all pull out their computers and half of them ain't ever been booted up this year. (Participant 15, January 2010)

Participant 15 described how his class was impacted by the lack of students participation because the majority of students left their IPAP issued laptops at home because they felt that carrying around a computer that was seldom used by faculty members was a waste of their time and energy.

"I" and "G" Virtual Drives

The "I" and "G" drive are virtual drives located on the AMEDD server. These drives are used by faculty members to store their personal and professional documents. Since the Department of Defense ban of using USB devices, these virtual drives have been used quite extensively to save documents. The current issue is that the "I" and "G" drive may be removed from the AMEDD network soon. The IPAP has begun making this transition by moving many of their instructional documents to *Blackboard.* Leadership has tried to encourage faculty members to begin this evolution as soon as possible in order to have access to their professional and personal data. Additionally, leadership felt that making this transition more sooner than later will expedite faculty member's adoption to the new technological changes being implemented. Some participants (3 of 15 [20%]) expressed the following concerns about placing their documents on *Blackboard* without potentially having a storage area to maintain and retrieve their instructional data in case *Blackboard* servers fail.

> *Ease of use, speed, and compatibility with other computers and software programs at the AMEDD are important to me. The "I" drive works ….99.9% of the time that thing is right on the money. I prefer the 'I' drive as opposed to trying the internet and Blackboard when trying to teach. I don't think the network is quick enough. With DOIM blocking everything…..and the slowness of the network when trying to retrieve information from Blackboard….then I have a problem with it. Otherwise, if I had the 'I' drive all the time; I don't need the other stuff. I don't care if the internet is not working. I don't need it to function or to teach my students and especially the USB thumb drive thing. If we have the 'I' drive or thumb drive, and we have those options….that's fine. But if they only have us depending on the internet, and the internet doesn't work right; that a problem. Civilian schools and universities don't have that problem….you know….the security issues. I understand why we have it and that's fine but*

gives us other options. "I WANT THE 'I" DRIVE." (Participant 11, January 2010)

Participant 11 describes her frustration with being told that her only reliable source of document retrieval called the 'I' drive may be taken away, thus leaving her with an unreliable web-based technology system.

> *I use Microsoft PowerPoint and I use it for my lectures. My lectures are on what you call the 'I' drive. That's my own personal drive. That's where all my lectures are; so that I could pull them up regardless of the status of Blackboard. Yeah, Yes Sir, Please Don't Tell Me you are taking away my 'I' Drive. Let me tell you a little secret, I don't put any of my tests here [Knocking on his computer], No test what so ever! Ah….the test bank and all that business, I got no business in there. Four times in my tenure, four times in my eight years here, I've had to write a new test within 24 hours. (Participant 15, January 2010)*

Participant 15 emphasizes how important he believes the 'I' drive is to data retrieval and security. He argues that he will not place his documents on a web-base management system that could become compromised.

Technical support with equipment

Technical support refers to the resources available at an organization to maintain and sustain current and integrated technologies. For this study, it includes policies, procedures, and most importantly support staff.

A majority of participants (11 of 15 [73%]) expressed their displeasure with technical support. Many expressed the need to evaluate current policies on technical support. More than half expressed lack of appropriate and timely support on hardware devices, and the majority of participants did not trust the infrastructure to handle the technological changes being implemented into curricula at the IPAP. One participant expressed his displeasure this way:

> *In terms of supporting technology, I feel that that's a failure in the military system. And I can only speak for the Army, because I suspect the Navy and certainly the Air Force are very different in their support of technology. The AMEDD Center School, in my estimation, has people in technology positions that have no training in technology. They don't have any qualifications and the job descriptions are written so that they don't have to have a degree in information management or information technology. They don't have certifications in Microsoft or Networks; they just have to be capable. So when you get those types of people over your head, they don't know what they are talking about. And they…and for example, Blackboard is a classic example. There are for the entire AMEDD Center School, they have some people that have some Blackboard training but they are depending on their solution for training Blackboard, which is going to*

be a big [P7 pounding on his desk] platform for this installation. They are depending on TRADOC [US Army Training and Doctrine Command located at Fort Monroe near Hampton, VA] back in Virginia to supply the training from a distance. And that's….and the one faculty member who I had who used it said the one or two time he's used it because it was on a military platform, it broke down and they weren't able to do the training. And the training is very simplistic, it's geared for everybody, it's not geared for …you know…individuals. So there is…and this has been a problem in my estimation since I've been in the Army. The Army has technology, but they never created authorized required positions, either for military trained people or civilian trained people to deal with the technology. It's quite different than what happens across town at the University of Texas Health Science Center, where they have people trained in Blackboard to assist. (Participant 7, January 2010)

Adequate technical support is paramount for the success of instructional technology adoption. Participant 7 described how technical support at the AMEDD was not sufficient or competent enough to handle IPAP requirements. Also, not having technical support in place that was attentive and familiar with the needs of the IPAP staff has slowed the adoption rate for instructional technology. Many faculty members interviewed expressed concerns pertaining to their ability to acquire technical support in a timely manner.

DOIM (Directorate of Information Management)

DOIM is located on most major United States Army installations. Literature describing DOIM suggests that its mission is to provide information management support for various commands located on Army installations. According to the literature, DOIM functions include: (a) provide oversight of information management programs, (b) determine information requirements, (c) develop and coordinate technology plans with its customers, information management budget planning with its customers, (d) provide necessary administrative and logistical support, (e) ensure information systems are in compliance with the Department of Defense and the Department of the Army standards, (f) manage overall security of the information technology system, and (g) provide information management training programs for civilians and military manpower. During data collection, about half (7 of 15 [47%]) described their displeasure with the level of support received from DOIM. The study found that the lack of functionality and flexibility in the AMEDD computer network supported by DOIM was causing some participants to bypass the network altogether and work from home. Some of the ways participants summed up their annoyance were:

> *Take note of this one [In a sarcastic voice] Directorate of Information Management, otherwise abbreviated as (DOIM). They are the biggest roadblock with anything we do in the military. When I start looking up hematology terms, and get what I call the "DOIM Dump", the big thing comes up and said "NOT ALLOWED ACCESS TO THIS SITE." And this is strictly medicine. They have no clue as to how to filter this correctly. So that stands in the way of me doing my job. I have to go home to do my*

research because this computer won't let me have access. So, the biggest thing is DOIM; other than that, I don't see any other barrier. (Participant 3, January 2010).

Participant 3 describes how barriers such as internet web-sites being blocked can interfere with faculty members being able to perform their duties as an instructor. This certainly slows the integration and adoption of technology. Another faculty member mentioned similar problems, he stated:

Yeah, QuickTime, I don't know what it is, but I do know that there's a recurring problem with DOIM. And I will just use the 'none technical' [emphasis on describing this term] form that everyone understands "messing around remotely with computers"...cause all the computers here on the laptop and on the podium…the podium computer. And they'll do that and all of a sudden, the faculty member will come in and they can't run the video clips for their thing, because DOIM has changed something. And they are not in the chain [chain-of-command]. We have no control over them, and they do what they want do. DOIM simply strips everything off of all computers and then loads only software that they want. And they are highly restrictive on what sites can be connected to that computer and makes it very difficult for these computers to function; um, they can only function in this environment. If students take them home, they….don't believe they will function very well. They can't connect to the internet, *we're not allowed to connect any devices to the internet, any external drives, and thumb drives…it's been extremely….it's been very non-supportive, antagonistic environment to use laptops. When we use the network system, we have the tendency to make it crash. (Participant 7, January 2010)*

DOIM is responsible for maintaining a secure information management system for Fort Sam Houston. However, some of the steps and procedures used by DOIM to maintain a cyber threat-free environment create problems for their clients. Technical support from DOIM must be able to provide some kind of balanced coverage while maintaining a cyber threat-free environment that meets the needs of both IPAP and DOIM. Otherwise, as described by one faculty member, they will be viewed as an obstacle rather than a solution to the problem.

DOIM [Chuckling]!"Department of IMeny" [Being sarcastic, suggesting that DOIM has been more of an enemy or adversary than an ally] It's frustrating, all the blocks that they have…on the military. (Participant 11, January 2010)

Data Security

Additionally, some faculty members (6 of 15 [40%]) expressed concerns pertaining to data security and infrastructure reliability not being fully addressed before a designated implementation date was announced. Participants expressed these concerns in the following ways:

Some of the issues have to do with security…specifically test security. Preventing the compromise of testing, test pools, and questions…it's a long road. (Participant 10, January 2010)

They sent out a step-by-step procedure on how to put your test questions on Blackboard….which I haven't even figured out yet; it seems very complicated to me. And with my workload right now with teaching, I don't have time for it….for the frustration. Ah, I'm a slow person when it comes to that kind of thing….and there is also not enough security in my opinion to just be throwing my questions out there. (Participant 11, January 2010)

Training and Faculty Professional Development

Training and professional development were two key finding in this study that had a perceived effect on the level of instructional technology adoption by faculty members. According to Guskey (2002), educational leaders should plan and focus on training and professional development programs that are geared toward the implemented changes that affect teachers. These changes according to Guskey, "must become a natural part of teachers' repertoire of teaching skills. "Especially for program continuation and expansion, teachers must come to use the new practices almost out of habit" (p. 388). For this study training and professional development were found to be interlinked. Faculty members noted that in order for them to use certain forms of instructional technologies, they needed to know how the technology worked and how it could be used to improve their method of teaching.

This study found an overwhelming majority of participants (12 of 15 [80%]) expressed concerns related to the use of technologies such as *Blackboard*. The concerns were related to access during peak server usage, training or the lack of training, and professional development. These findings are consistent with the findings described by Albright (1996) in the review of literature. More than half of these same participants explained that some training from colleagues is present but no beneficial formalized training existed. Keengwe, Kidd and Kyei-Blankson (2009) identified the need for faculty training in order to successfully integrate technology in an organization. Participants summed up their thoughts and experiences as followes:

> *The instructional technology training I've received? [Sounding sarcastic] Okay, I have received a small amount of training in Blackboard, and Blackboard is certainly our up and coming baby here….I mean….we're migrating…our testing away from LXR[testing software] to Blackboard. We're migrated….and I may be about one of two instructors who have actually used 'Discussion Board'; which is a huge technology. (Participant 8, January 2010)*

This participant describes how he only received a limited amount of training in *Blackboard* application.

> *At the IPAP? Oh no [Chuckle] I have not had any training in instructional technology here at all. My Blackboard includes some work with computer programming. I have a mixed bag in my background. I was not given*

instructional training here at the IPAP. I've received training outside of IPAP….that IPAP paid for and supported. (Participant 10, January 2010)

I think it's just that when the changes come, it doesn't come with a training module; or it only comes with on the job training. So if something that we could say to improve the process, they are going to bring us a new change perhaps just have someone who is knowledgeable on the subject give us a quick lecture or a quick hands on this is how we do it. And we did it for 'My Evaluation.com' software. That happens to some, but it doesn't happen with all. (Participant 4, January 2010)

The majority of participants, 80%, described the partial training they received for *Blackboard*. Many indicated that they would adopt this technology tool if they were given adequate training and trusted the infrastructure and the security of data stored on it. When faculty members were asked about instructional technology training, an overwhelming majority (13 of 15 [87%]) only report the single episode of *Blackboard* training they received. The following are illustrations of participants' remarks regarding training and professional development:

We um, well the most recent example is over the trimester break for two weeks we had classes scheduled for over a week period of time. We would have step-by-step lessons on how to create exams, how to move or how to produce lesson plans; how to um, transfer PowerPoint presentations to Blackboard. We have faculty development meetings occasionally over *lunchtime or off-sites, where we brainstorm or talk about the same type things. (Participant 9, January 2010)*

Um, again…not a whole lot, we've had a little bit of 'hap-hazard' training with DCO (Direct Contact Online) and there was a big push for that, and then it just kind of fell off the radar. Blackboard they've tried to do some individual training, and I think people are just bucking the system. And so, I've spent 3 hours with the instructor and I've spent some other time….and he's certainly available for questions. But not everybody has the same load…and there's no….no push from above to say that everyone will have all this training done by this point. Even if there was a push… [Thinking] [Saying in a loud voice] "I'M TRYING TO THINK OF THE POLITICALLY CORRECT WAY TO PUT IT." Um, I don't think that there's enough um….force from higher up to enforce it. (Participant 13, January 2010)

The researcher found that participants' length of time assigned at the IPAP varied from three months to eight years. Faculty recently assigned to the IPAP experienced the same restrictive barriers that affected seasoned faculty members adopting rate of technology. Training and professional development pertaining to recently introduced technologies could prove beneficial to increasing the adoption rate of technology by all faculty members.

Discomfort with Technology and Lack of Motivation

Participants were coded in this area based on the two subcategories of: (a) reluctance to use new technology (technophobia), and (b) lack of enthusiasm (motivation) to learn new technology. An aversion or anxiety toward technologies and technology-based products is described as technophobia (Mitchell, 1994). Many people exhibit discomfort with technology. But occasionally some individuals become so apprehensive that they avoid learning how to use technology, or simply refuse to use it. This type of apprehension toward technology can have an adverse effect on an individual being introduced to new technology, thus affecting their ability to be productive in a technology-based organization. The results of this study did not find any faculty members that had a fear of technology. All interviewed participants described using some type of technology on a daily basis, such as email, internet, word processors, and smart phones. Although there was one participant who acknowledges his lack of enthusiasm in using certain forms of technology like Microsoft Outlook calendar feature over his desk calendar, he admitted that he was trying to adapt to all forms of technology being used at the IPAP.

According to Bergmann and Brough (2007), some educators consider expending extra time to learn new technology a low priority. Bergmann and Brough augured that learning how to use new technology usually requires time commitments that exceed a one-time demonstration. In addition, the authors point out that professional and personal activities occurring in faculty members lives may take priority over learning how to use new technology. For example, Horn (2002) explained that time commitments, motivation to learn additional information, and prioritizing teaching duties may receive higher priority because of competing demands on faculty time. Being motivated to learn new technology is a barrier, especially without allotted time to learn the new technology. Conversely, Bergmann and Brough (2007) pointed out that learning how to adapt to increase demands is a personal and motivational factor. Also, not being able to adapt and learn how to take on more can present a challenge for faculty members set in their ways. The authors argue that it is easy to become complacent but altering your teaching methods requires additional motivation and energy regardless if it is with technology.

There were some participants (3 of 15 [20%]) that could be described as *laggards*. According to Rogers (2003), "*laggards* are the last in a social system to adopt an innovation" (p. 284). One participant mentioned earlier described how he was reluctant to use the latest technology, he stated:

> *I bought a cell phone because I had to…because I was on call. But um, that's it, and it's a problem. I admit it. I still have a cassette deck in my truck; because I have a bunch of cassettes. My biggest thing is my age. I'm just a grumpy old man, and set in my ways. "You can't teach old dog new tricks"; although I'm trying. (Participant 3, January 2010)*

This participant acknowledges that he is comfortable using current teaching techniques and is really reluctant in adopting new forms of technology. Throughout the past twenty-five years, researchers have discovered that one's attitude toward technology has been a consistent strong predictor of their acceptance, adoption and use of technology. Research by (Davis 1989; Davis, Bagozzi, Warshaw 1989; Mathieson, 1991; Taylor & Todd, 1995); found that individual's perception about the usefulness of the technology is the most critical belief contributing to their decision to adopt new technology in the workplace. Participant 3 in a cynical manner made light of his age being a factor for his reluctance to adopt new forms of technology. For many years, researchers have argued about the socio-cognitive changes associated with chronological age changes. Research from Wechsler (1958) argued that aging was accompanied by decreased intellectual ability. However, research by (Baltes & Lindenberger, 1997; Botwinick, 1967, 1977) suggests that unless a mental debilitating disease process exists, there is no significant decline in one's mental abilities. Behavior theorist suggests that an individual's attitude toward using new technology is the major factor in their adoption of new technology. Moreover, research by Crooks, Yang, and Duemer (2002) found that faculty with more years of teaching experience or those teaching at the doctoral level had the most favorable attitude toward using technology. The authors note that anyone assuming that only younger faculty members appreciate using technology should rethink that thought.

Time Commitments

Using data analysis from face-to-face interviews, document analysis (instructors class/teaching calendar), and on site observation, the findings suggest that time commitments was a central factor relating instructional technology adoption by IPAP faculty members. The average instructor spends about 25 hours a week with students during lectures and office hours. If an instructor is a class advisor, their time commitment with students can increase anywhere from 6 to 10 additional hours. Course preparation time (updating lecture materials, researching latest medical information, proctoring test) can add an addition 5 to 10 hours per week onto an instructor's weekly schedule. Collateral duties which are common additional job assignments for military personnel can add 4 to 15 hours a week to an instructor's weekly schedule. Physical fitness, CMEs (continuing medical education), and occasional clinical duties can add another 5 to 15 hours a week. A study conducted by Cavanaugh (2005) found that two of faculty members' major concerns about using instructional technology for teaching were lack of time to develop instructional coursework that uses computer technology and lack of time to develop and organize training classes that centered on instructional technology. Table 5 contains a summary of time commitments placed on an IPAP instructor during an average week.

An overwhelming majority (13 of 15 [87%]) of participants mentioned time (e.g., not having enough time to figure out how to use technology such as *Blackboard*) as being an influential factor in their adoption of new instructional technologies. Participant 1, for example, stated:

> *"There are many outliers who are reluctant to adopt new technologies. I think providing training, providing the time and resources to get that done; that's an important thing." (Participant 1, January 2010).*

Participant 10 argues that people will find the time to learn a new technology if they are interested in that particular technology. He states:

> *"People are busy; they don't want to take the time to learn certain technologies. However, once they start to see what a program like Blackboard can do for the students, I think that they will begin to adopt very readily." (Participant 10, January 2010)*

Participant 14 suggests that people just use time as an excuse and are reluctant to change the way they teach:

> *For example, some people have said, Blackboard that's great, but I'm not buying what you are selling, I don't have time. I don't have time to mess with that; that is always the easiest excuse I think. So that is a*

barrier….TIME. Um, I guess another would be that sense of the devil I know, I've always done paper….paper has always worked for me; no sense in changing. Can you change that; can you change that aspect of human nature of certain instructors? I don't know. If you give a military order, I guess you can effect change? But is that the right change?

Table 5:

Summary of Total Weekly Time Commitment (Hours) Spent by IPAP Faculty Members.

Summary of Total Weekly Time Spent (Hrs) by IPAP Faculty Members	
Activity	**Hours**
In Class Lectures	10 - 15
Office Hours	5 - 10
Class Advisor	6 - 10
Course Preparation	5 - 10
Collateral Duties	4 - 15
Physical Fitness	2 - 10
Continuing Medical Education (CME)	1 - 5
Clinic Duties	2 - 8

Financial and Budget

Funding has been made available to expand classrooms, and to the Interservice Physician Assistant Program for equipment for faculty use. These improvements are irrelevant, without a corresponding commitment from all stakeholders. More than half (9 of 15 [60%]) of the participants brought up the subject of money, budget, or finance as a potential barrier. Each occurrence except one implied that budgetary issues would be a limitation for integrating new technology at the IPAP. As discussed under *'findings of factors that facilitated the adoption rate of instructional technology--funding availability'* (p.82-83), the barrier stemmed from logistical obstacles. Many of the participants discussed how they were able to obtain instructional technology tools effortlessly over the last two years, but receiving the required resources to make these technologies perform smoothly presented barriers to the adoption rate. As noted, faculty training, competent technical support, and technology infrastructure were named as chief obstacles to integrating technology by faculty members.

Leadership Role in Instructional Technology Adoption

The successful adoption of instructional technology requires strong leadership at every level of the organization (Garrison & Akyol, 2009). According to Bryant (2003), exploring the role of leadership styles provides knowledge and competitive advantages into understanding the involvement of leadership in facilitating the adoption of technology into an organization. All of the following features described the role of IPAP leadership integrating instructional technology, which helped to facilitate the process for faculty members.

Program director vision.

The researcher observed the program leader in his natural environment, coordinating daily activities at the IPAP. The program director has many duties; of most notable is that of coordinating long range planning. During an interview with the researcher, the director described his vision of modernizing the method of instructional training for IPAP students. He suggested this transformation would make the program operate more efficiently and be more effective in training PA students to become future clinicians. He explained that he would like to see the program become paperless, with all aspects of didactic training computerized. According to Noonan (2003), the best way to prepare for the future is to create an environment that can adapt to change. Transformational leaders have a knack for being a change agent for an organization. As Bass and Avolio (1997) pointed out, transformational leaders are good visionaries. Research by Schepers, Wetzels, and Ruyter (2005) found that transformational leaders were more receptive toward accepting technologies within service organizations. Similarly, Yammarino and Bass (1990) found that many military leaders demonstrated transformational leadership traits when compared to transactional and laissez-faire leadership styles.

Goals of technology implementation.

Being a visionary leader, means that the vision has to be defined as to why the change is occurring (Starratt, 1995). The desired direction and goals associated with the change must be disseminated to all stakeholder involved in the process (Garrison & Akyol, 2009). When participants were asked "What role do program leaders play in facilitating faculty members integration of instructional technologies?" Many of the participants answered by describing IPAP leaders as being extremely involved in integrating new technologies into the PA program. Some participants answered that the role of leadership is to explain why a change is occurring. Whereas many participants pointed out that program leaders did an excellent job in explaining why a particular change was being implemented, but a number of participants were not quite sure how leaders were going to meet their objective. Many participants answered, they knew that start dates were set my leaders to meet certain milestones, but they described being frustrated when problems occurred in the process that impacted their style of teaching. Louis and Miles (1990) explained that implementing change require leaders to discuss their vision(s) for the school so that faculty members can understand and believe that leadership vision reflects their own interest. In addition, the authors explain that leaders must demonstrate or clearly visualize what it will take to reach the desired goals. Sharing the vision is a way of sharing responsibility and accountability with faculty members (Manassee, 1984). Communicating the goals with all stakeholders and demonstrating a visible commitment to the vision were cited by Manassee as an important leadership role that must be done in order to accomplish desired objectives.

Stakeholders.

According to the Merriam-Webster (2008) Dictionary, “stakeholders” means “one who is involved in or affected by a course of action.” While this study focused on the roles of IPAP program leaders in instructional technology integration by faculty members, it became apparent to the researcher that all stakeholders aided in the adoption and integration of technology process. Stakeholder consisted of program leaders, faculty members including central office personnel, IPAP students, the AMEDD Center and School administration and technical support staff, DOIM leadership and technical support staff, and external support staff from Fort Sam Houston. An interruption or disturbance in the role of stakeholders can disrupt the technology integration process. The role of leadership is to monitor and periodically check and analyze the progress of technology implementation. Louis and Miles (1990) cite the need for leaders to periodically monitor the progress of the planned improvement in order to coordinate or orchestrate changes or deal with problem appropriately.

Professional development, training and technical support.

Throughout the study many participants indicated that training and technical support was insufficient for the degree of instructional changes that have occurred over the past two years. A leadership role that must be satisfied in any change endeavor involves providing staff with training and professional development (Louis & Miles, 1990). According to Russell, Mazzarella, White, and Maurer (1985), effective leaders demonstrate their commitment to the change process by directly participating in staff development with faculty members. They suggest that leaders should take an active role in planning, implementing, providing resources and evaluating training.

This study found that infrastructure technical support to sustain the web-based course management system at the AMEDD center and School was insufficient. The participants indicated that *Blackboard* would be the primary technology used to support the majority of instructional materials used by IPAP faculty members. The results of the study revealed that IPAP leaders understood the infrastructure requirements at the classroom level. Also, it appeared that they had a sense of what it would take at the building level (AMEDD Center and School) to support their needs. However, there seemed to be a disconnect between the IPAP, AMEDD C&S, and DOIM. The role of leadership is to establish strategies during the planning process that involves stakeholders like AMEDD C&S and DOIM. Unless everyone is onboard with the planned changes, obstacles will materialize somewhere along the process that could derail the proposed change.

Technology plans periodically reviewed and updated.

According to Louis and Miles (1990), improvements efforts, even well throughout plans, commonly encounter problems at some point. Some may seem so irrelevant that they may not even be perceived as problems. In contrast, severe problems can wreak havoc on proposed changes. This study found that several continuous problems emerged that presented as barriers to the adoption rate of instructional technology. The role of leadership is observing the progress of change. Additionally, leaders must occasionally review the proposed change or changes to see if the change is still warranted or practical. The leader must be able to acknowledge that a problem exists and be willing to make adjustments, postpone, or suspend the proposed changes if they have become outdated. Figure 2 illustrates the role of IPAP leadership when implementing changes to facilitate instructional technology adoption by faculty members.

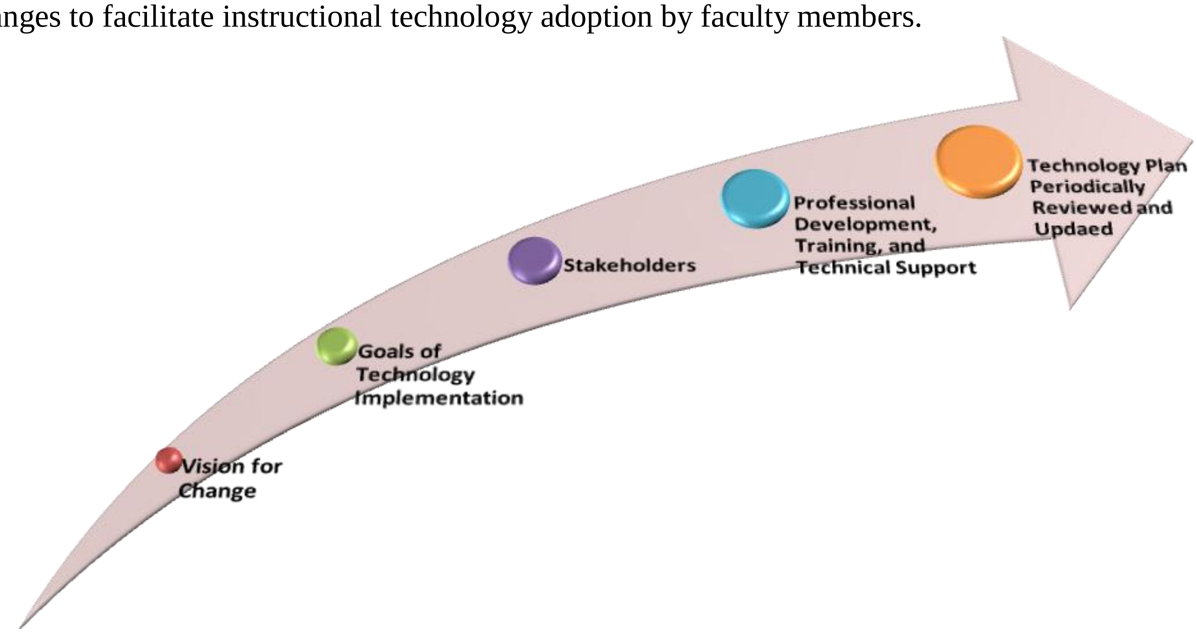


Figure 2. IPAP Leadership Role in Instructional Technology Adoption

The majority of participants considered leadership to be a positive guiding force toward influencing faculty members to adopt instructional technology at the IPAP. Participants described the current culture and support for instructional technology as being in the growing stage. Moreover, half of the participants felt that factors such as infrastructure, training, technology capabilities, technical support, and data security were areas of deficiency by leadership. The following views concerning the role of leadership are pointed out by these comments from participants:

> *For technology to be implemented you're talking about cultural change, organizational change, you can't do that by few; you just can't come out and bludgeons people. You can, but it doesn't work that well. So far the transition has been gradual. There is a four month deadline, and people are required to put at least one test on Blackboard by this trimester; and so that good gradual approach is fantastic. We have a wide range of instructor here; some are computer illiterate and some are super users. While several users can adapt rather quickly, they present with their own issues. Those who can't do this stuff don't want to do this. It will take a lot more hands on training; a lot more "touchy-feely" work with them, which takes time. If you try to do this over night, they will fall through the cracks. Then the program will suffer. I think that the program leaders approach is very wise and very achievable; it a reasonable approach. (Participant 10, January 2010)*

Participant 10 emphasized the importance of leadership not taking a hasty approach when implementing technology into the organization.

> *We have no leadership!!! I explained to the program leader that we have 'hiccups' in the system and he asked me was I still able to pull up my lectures from Blackboard; insinuating that if you can retrieve your lecture then you should be able to teach. (Participant 15, January 2010)*

Conversely participant 15 felt that leadership was rushing the process without taking into consideration technological glitches that could disrupt course instruction.

> *I think the leadership here is good; I don't have any complaints. They are pretty open to it; they are willing to invest money into technology. They may not see a rapid return from all of that money right away, but they are still willing to invest into technology here, so that's good. I think that's important. (Participant 1, January 2010)*

The three research questions were largely satisfied by the findings presented in this chapter. The principal findings in this case study revealed that faculty members of the IPAP identified a number of factors that act as barriers toward their adoption and integration of instructional technologies. The findings revealed that factors affecting adoption and integration are: (a) infrastructure including internet and server capabilities, (b) software and hardware issues, (c) technical support with equipment, (d) professional development and training, (e) discomfort with technology, (f) time commitments, (g) financial and budget issues, and (h) leadership role in the adoption of technology.

Perceptions of Leadership Behaviors that Affect Technology Adoption

The leadership of the IPAP is clearly committed to incorporating current and emerging technologies into the curriculum. Conversely, the program director described the adoption rate of technology as being low by his statement: "*They are being dragged kicking and screaming, I can count on one hand those that have readily accepted instructional technology changes and have gone on to learn more about it. The rest of them are being forced to um…to cooperate."* The results of this study actually found that (12 of 15 [80%]) of participant were motivated to use the instructional technology introduced over the past two years. The participants suggested that IPAP leaders were committed to leading them into the future with instructional technology. They described how leaders were able to articulate their vision, mission, and goals to modernize educational instruction with technology implementation. However, many faculty members acknowledged that they found it difficult to adopt the technology without the necessary resources and organizational supports (compatible equipment, technical support, infrastructure, training, and human resources) being in place. In addition, participants pointed out that in order for them to adopt and implement the technological tools, they needed to know how to use the technology and trust that it is reliable. Many participants agreed that organizational support was important, most pointed out resources as a key factor that influenced their ability to adopt technology. A majority of participants indicated that integrating and adopting new technology was a time consuming process. With pressure to teach, office hours, advising classes, course preparation, collateral duties, physical fitness requirements, medical professional development, and clinical duties, the faculty reported that they lacked time for other responsibilities.

Analysis of Findings

The findings were analyzed, interpreted, and synthesized into the following analytic categories:

1. Factors that inhibited or facilitated the adoption of instructional technology at the IPAP. *(Research Question 1)*
2. Instructional technology evolution at the IPAP over the last two years. *(Research Question 2)*
3. Program leaders' role in the integration of instructional technologies as perceived by IPAP faculty members. *(Research Question 3)*

The aforementioned analytic categories are directly associated with each of this study's research questions. During the constant comparative method of analysis, the researcher: (a) searched for connecting patterns within the analytic categories; (b) developed and integrated the analytic categories into themes; (c) formed a theory; and (d) generated a visual model (see *Figure. 2,* p. 125) that explains this theory (Glaser & Strauss, 1967). As a secondary level of analysis, the researcher tied the relevant theory and research themes to issues raised by the review of literature.

This chapter presented the findings of this study by organizing the collected data into categories that formed a readable narrative. It also provided an interpretation of the findings. It presented an integrated picture of the collected data, and analyzed these findings using descriptive information, literature from prior research, direct participant quotations, and visual displays. The discussion takes into consideration the literature pertaining to leadership and factors affecting the adoption and use of instructional technology in educational settings. The implications of these finding are intended to enhance the understanding of the perceptions of why the level of adoption of instructional technology varies among faculty members.

Factors That Inhibited or Facilitated the Adoption of Instructional Technology at the IPAP

The first research question sought to determine what factors inhibited or facilitated the adoption rate of instructional technology at the IPAP. Inhibiting barriers to change came in many forms at the IPAP. Six of the most prevalent barriers described by participants as shown in Table 6 were: (a) Implementation of technology (software and hardware), (b) insufficient infrastructure to handle technology, (c) technical support including data security, (d) financial budgetary issues, and (e) time commitments, and (f) leadership role in instructional technology adoption. Participants indicated that training on instructional technologies is essentially non-existent. Participant 6 pointed out:

> *In my opinion training has been a little weak, because we are doing Blackboard now…we are doing some classes, but it is still coming online very slowly. I say as far as what I've noticed in the 3 years that I've been here, there has been very little IT taught. You either knew it or you didn't, you either came here with it; are just the word of mouth…you know. For example, you would say…hey you know how to do this; can you sit down and show me how to do it? And so… it was a lot of word-of mouth passing information on how to do something. But as far as formalized training, that has been a deficiency. (Participant 6, January 2010)*

Frazier and Bailey (2004) give credence to this perspective when they point out:

> *Integrating technology into an environment is a complex developmental process for individuals and the systems in which they work. To change the way they teach and the materials they use requires time, commitment, risk taking, adequate resources, and consistent and patient support. The technology coordinator needs to be able to inspire faculty members with vision of how effective technology integration can benefit them and demonstrate activities, lesson plans, and processes that make exciting use of technology resources (p. 40).*

The results of factors that inhibited the adoption of instructional technologies at the IPAP are described in Table 6.

Table 6:
Factors that Inhibited the Adoption of Instructional Technology.

Factors that inhibited the Adoption of Instructional Technology at the IPAP	Percentage of Participants
Infrastructure	(6 of 15 [40%]) voiced concern about infrastructure.
Technical Support with Equipment	(11 of 15[73%]) expressed their displeasure with technical support.
Dedicated Technical Support	(5 of 15 [33%]) would like to have permanent capable personnel assigned to handle IT issues.
DOIM (Detachment of Information Management)	(7 of 15 [47%]) voiced displeasure with the technical support of DOIM.
Data Security	(6 of 15 [40%]) expressed concerns pertaining to data security not being addressed before implementing a start data for testing on *Blackboard*.
Training and Faculty Professional Development	(12 of 15 [80%]) expressed concerns related to the use of technologies such as *Blackboard*. (13 of 15 [87%]) said they only received a single episode of IT training which was for *Blackboard*. (10 of 15 [67%]) of participant descriptions, there is a concern about instructional technologies being forcibly introduced without faculty being adequately trained.
Discomfort with Technology	(3 of 15 [20%]) of participants could be described as "*laggards*." According to Rogers (2003) "last to adopt an innovation" p. 284.
Time Commitments	(13 of 15 [87%]) of participants mentioned time (e.g., not having enough time to figure out how to use technology such as *Blackboard*) as being an influential factor in their adoption of new instructional technologies.
Financial and Budget	(9 of 15 [60%]) of participants brought up the subject of money, budget, and finance. Each occurrence except one implied that budgetary issues would be a limitation for integrating new technology at the IPAP.

An analysis of the findings pertaining to slow adoption revealed that, generally, faculty member's attitudes toward technology integration into their instruction were positive. They viewed technology as being beneficial to the learning process for physician assistant students. They recognized the potentials for using web-based course management systems, simulators, and software that minimizes the need for paper and increases access to resources between faculty and students. However, some faculty members displayed little enthusiasm to adopt these technological changes. The researcher observed that many faculty members displaying positive attitudes about instructional technology, but their optimistic views did not match their use of technology such as *Blackboard.* Many faculty members lacked the skills to use the technology they were expected to implement into their curricula within a set timeframe. With the goal of integrating technologies to make the program a paperless learning environment, program leaders ignored faculty's abilities, skills, and interests to use these technologies. This resulted in equipment such as SimMan lying idle in a closet or other forms of technologies being underutilized.

Insufficient technical support and training for faculty undermined the use of instructional technology by faculty. Faculty members were not provided adequate training before technology was provided, even for those who were able to learn on their own or from peers, continuous support was limited when provided. The lack of competent full-time technical support dedicated to the needs of IPAP faculty created less interest for technology adopting and integrating. Thus, it became difficult for full-time support from DOIM to address the various needs of the program; still faculty members are under pressure to implement technological changes that affect their teaching style.

Infrastructure Analysis

Over the past two years, the IPAP has increased its student population from approximately 240 annually to about 310 annually. This increase student population coupled with the integration of web-based course management software, student's laptops, and the move toward a paperless teaching and learning environment has placed a tremendous demand on the AMEDD Center and School technology infrastructure. Since 2008, an additional 15 training programs have been added to the AMEDD C&S technology infrastructure. Also, roughly 25,000 resident students are trained annually at the AMEDD C&S Fort Sam Houston with another 15,000 students trained via correspondence courses maintained by this same infrastructure. This current demand on the infrastructure plus the potential for additional growth within the next several months from other programs and new technologies, it is essential that the AMEDD C&S maintain preparedness for these demands.

Other important areas to consider were infrastructure reliability, cyber security and maintenance. Furthermore, at the time of this study IPAP had only a basic Air Force airman that was responsible for maintaining the computers when they developed problems. The airman was also responsible for overseeing the distribution of student's computers and acting as a liaison person for contacting DOIM when repair orders were requested. The IPAP did not have a dedicated technician responsible for preserving and maintaining its computers or implementing training for faculty members on new software and hardware technologies introduces to the program.

Technology Support and Data Security

The absence of a dedicated in-house technical support expert has been described by participants as an obstacle to the smooth integration of instructional technologies. In this case, having an infrastructure equipped with resources that provide adequate support plus training. Throughout this study the researcher found faculty members who became discouraged when something went wrong with the integration of various technologies, only to return to old traditional methods of teaching. According to Rogers (2003), complexity is a factor as to whether a technological innovation is adopted. If the new technological innovation is too complex and lack adequate technical support for a smooth transition, adoption and integration of that particular technology may not happen.

Historically, having an unsecure data storage platform has halted any software applications at the IPAP. If faculty members feel that the integrity of a system compromises databanks for their course, they will not use that technology. Two participants explained that over the last two years, they have experienced data security breaches that negatively influenced their decision to adopt certain instructional technologies.

Technology Implementation and Changes

In this study, the question of how instructional technology has evolved over the last two years at the IPAP can first be explained by looking at how technology has affected its faculty members during this period. Instructional technology primarily changed how IPAP faculty members prepared and taught their courses. The technological changes mentioned by participants can be found on Table 7. This table shows that *Blackboard* was the primary software introduced over the last 2 years. This particular web-based course management software had the greatest influence on faculty because it was being introduced by IPAP leadership as the main source for data storage, retrieval, testing, and course management. In addition, its mandatory implementation within a set timeframe made it the main topic of conversation during data collection. Trotter (1999) argues that the transformation of instructional technology from software and hardware into teaching tools depends on how knowledgeable, skilled and enthusiastic faculty members are in using technology on behalf of their students. Analysis from this study found that integrating *Blackboard* produced mixed emotions from faculty that ranged from enthusiasm to resistance.

Human Factors: Resistance to Change

A small percentage (3 of 15 [20%]) of participants could be identified as being resistant to change. An analysis of the finding suggests that lack of skills, reliance, and confidence contributed to faculty's limited use of instructional technologies. Faculty were concerned that if they attempted to incorporate certain technology into their instruction, there was the possibility that it would not work properly. They also felt that they would appear incompetent in front of students, and that students may know more about that particular technology than the instructor. Many faculty members explained that the possibility of technical problems discouraged them from using technologies like *Blackboard*. The three resistant participants said they had some concerns about implementing policy that required them to use technology that has not proven to be reliable enough to use in their classrooms. Each of them admitted that they were not confident using new forms of instructional technology without being properly trained. One participant even acknowledged that he was totally hesitant in using technology and primarily only used PowerPoint. Table 7 illustrates key instructional technology changes at the IPAP over the last two years with percentages of participant's comments pertaining to these changes.

Table 7

Instructional Technology Evolution at the IPAP over the Last Two Years.

Instructional technology Changes at the IPAP Over the Last Two Years	**Percentage of Participants who Mentioned Technology Change**
Blackboard	(15 of 15 [100%]) all participants mentioned that *Blackboard* was the primary software introduced the last two years.
My Evaluation.com	(4 of 15 [27%]) voiced concerns that its non compatibility with other *Microsoft* based software may hinder adoption rate by faculty.
Exam Master	(12 of 15 [80%]) mentioned *Exam Master* as new software technology being adopted at the IPAP.
USB (Universal Serial Bus) Security Measures	(2 of 15 [13%]) surprisingly, a small percentage of participants complained about the inconvenience of not being able to use USB devices.
SimMan and Harvey Simulators Mannequins	(5 of the 15 [33%]) described using mannequins within the last two years.
Smart Board & Smart Podium	(14 of 15 [93%]) described using this technology frequently during teaching.
Personal Response System (PRS) 'clickers'	(8 of 15 [53%]) over half of participants mentioned that the PRS can enhance their teaching experience.
Students Laptops	(5 of 15 [33%]) described DOIM as a major delay in first trimester students receiving their laptops in a timely manner.
"I" and "G" Virtual Drive	(3 of 15 [20%]) expressed concerns about potentially not having a storage area to maintain and retrieve their instructional data in case *Blackboard* servers fail.

Program Leader's Role in the Integration of Instructional Technologies as Perceived by IPAP Faculty Members

These findings point to the value of having leadership that supports instructional technology implementation in an organization. Additionally, Garrison and Akyol (2009) found that in order for technology to be adopted in higher education, leaders must provide encouragement and support to faculty members at each level of integration.

This study found that IPAP leaders believed that they encouraged and supported the initiation and progression of instructional technology integration. Many participants perceived the program leadership as a positive influence for instructional technologies succeeding; however, some participants felt that the process was moving too fast without the proper checks and balances being implemented. Concerns such as infrastructure, data security, training and technical support were areas that continue to emerge from *laggards* technology adopters. According to Costello (1997), the role of leadership is to function as a medium when introducing new technology to an organization. Leadership does not implant ideas but rather empowers the members of the organization to brainstorm and consider innovative technologies. For example, some faculty members contend that they were not involved in the decision process to integrate *Blackboard* as the primary method for administering tests to students. They claimed the decision to use the AMEDD C&S *Blackboard* site was made about two years ago, and the decision to switch to the UNMC Blackboard was made within the last six months. Most participants said that program leaders were accessible and listened to suggestions and recommendations.

As discussed in Chapter two, Schepers, Wetzels, and Ruyter (2005) observed that transformation leaders were more receptive toward accepting technologies within service organizations. Similarly, Yammarino and Bass (1990) found that many military leaders demonstrated transformational leadership traits when compared to other leadership styles. Bass and Avolio (1997) pointed out that transformational leaders are good visionaries. Visionaries have the ability to understand what instructional technology can mean to the way students are educated, the way that information is communicated, and the ways that educational institutions enhance their ability to teach students more efficiently through the use of instructional technology systems.

An analysis of the findings suggested that IPAP leaders demonstrated transformational leadership traits. The program director in particular made decisions based on the perspectives of organizational vision, mission of the program, high-performance expectations of the program, and helping faculty members and students meet their goals. As a visionary, leaders must be able to communicate to faculty members the purpose of change (Fullan, 2001). According to Fullan, caution must be taken when implementing changes and efforts must be made to get across the purpose of change to all stakeholders. IPAP leaders explained the purpose of change; to create a paperless learning environment, and to increase the effectiveness and efficiency of learning through technology. Although the purpose of change was communicated to faculty members, leaders did not effectively explain the progress of change. Thus, creating increased anxiety when technology failed and false speculation on why a particular technology is being implemented.

Peer Leadership

Peer support was found to be an important finding in this study in helping IPAP faculty members adopt and implement instructional technology. Statements made by participants showed that there was a vast amount of support for taking advantage of the technological experiences of colleagues. Three faculty members stood out as subject matter experts and peer leaders for providing guidance on instructional technologies like *Blackboard*, *Exam Master*, and *SimMan* and *Harvey* simulators. With the assistance of resourceful and skilled peer leaders, colleagues can successfully integrate new technology into their curricula. Peer leaders identified by participants as key subject matter experts were also touted as being valuable to the learning process of their colleagues. Participant 10 was described by many faculty members as being important to the integration and adoption process for technology. He was described as making fellow instructors feel more comfortable and more effective using *Blackboard*. According to Collinson (2001), peer leaders in education are important because they provide a resource for fellow colleagues to become proficient in new forms of technology. Sufficient guidance and hand-holding along the way by leadership and peers may promote adoption by those that may have otherwise given up of integrating technology.

Revisiting Delimitations and Limitations from Chapter 1

Delimitations Revisited

Lunenburg and Irby (2008) define delimitation as "self-imposed boundaries set by the researcher on the purpose and scope of the study" (p. 134). This case study concerned instructional technology used in a military medical learning environment; focusing on the program leadership and faculty members of the only military physician assistant program in the United States. A purposeful sampling technique was used to gather rich and thick information about the participants. Although the sample size of this study was limited by the number of faculty assigned to the IPAP, the researcher was able to gather rich and descriptive experiences from face-to-face interactions with participants; these experiences resulted in volumes of data for this study.

The criteria for selection was bordered by factors such as age, gender, educational level, military branch affiliation, and years assigned at the IPAP. Because the researchers' familiarity with the phenomenon under investigation pose the possibility of bias, the researcher designed this study using triangulation of multiple data sources to force a deeper understanding of the phenomenon rather than examining its familiar surface features. The researcher found that boundaries such as age, educational level, military branch of service, rank, or years assigned at the IPAP did not materialize into restrictions that would limit data collection. This select group of participants bounded by the aforementioned criteria provided rich descriptive attitudes and experiences of over half the faculty members at the IPAP.

Throughout the study the researcher attempted to remain objective and avoided drawing conclusions that could affect participants' answers, recollections of events, or findings. In addition, the researcher remained open to contrary findings. According to Yin (2009), to avoid bias the researcher should report contrary findings especially in the conclusions of the case study.

This case study looked at faculty adoption and use of instructional technology at a particular point in time of two years to ensure familiarity of the organization by faculty members, as well as historical and factual knowledge of technology use at the IPAP. Participants' length of time assigned at the IPAP varied from three months to eight years, which provided intriguing findings. The two year time frame use in this study found that participants' time assigned as an instructor at the IPAP did not change some of the factors that were perceived as creating barriers for adopting technology. The primary barriers of infrastructure, training, and technical support continue to dominate this window of time.

Limitations Revisited

Creswell (2005) defines limitations as “potential weaknesses or problems” identified by researchers that may negatively affect the results or generalizability of data collection and analysis (p. 593).

The combined armed forces physician assistant program made this a unique research project. It was initially thought that the uniqueness of the group’s culture would be a disadvantage, believing that in a military culture subjects would tend to be less critical of superiors. The possibility existed that they would lack openness which could limit this study’s ability to truly gauge leadership behaviors in facilitating or inhibiting instructional technology adoption. Lastly, the uniqueness of a military culture can foster similar thought patterns in policy decisions.

During the course of data collection, the researcher discovered that these limitations did not materialize. Both the military and civilian participants praised and condemned the approach that program leaders used to introduce new instructional technologies. Thus, this perceived limitation was not a factor during data collection.

This case study was conducted within the confines of a military medical learning environment on an Army installation located in San Antonio, Texas. Although the Uniformed Services University of Health Sciences (USUHS) located near the National Naval Medical Center in Bethesda, Maryland, is similar, in that military personnel are trained to become physicians, the training, leadership, budget, infrastructure, and technical support is different. The data collection pilot test conducted at the USUHS yielded different results based on these different characteristics of the schools. Therefore, additional research on a broader geographical scale and sample size is warranted.

Chapter Summary

This chapter presented the eight findings revealed by this case study. Findings were organized according to the research questions. Data from face-to-face interviews, document analysis, and physical observations revealed research participants' perception concerning their experiences with the progression of adopting and integrating instructional technologies into their curriculum. Various quotes from participants pertaining to the findings were used to provide a rich description of this qualitative research. By using excerpts, quotes, and phrases from participants, the researcher's goal was to assure readers that the contents of this study represent the reality of the persons and situations studied.

This chapter described the experiences of faculty members' adoption of instructional technologies inside a military medical learning environment. In summary, the prior discussion illustrates the complex nature of an educational organization, especially a military organization, as it struggles to integrate new technologies. The discussion revealed various reasons why faculty members easily considered or hesitated to adopt certain instructional technologies. It offered an explanation as to what faculty members feel are certain factors that either support or present barriers to their adoption of technology.

The effort of analyzing the findings was to produce a detailed description of a military medical learning environment's quest to integrate instructional technology. The researcher sought to produce a case study that captured this unique learning environment by analyzing the tremendous amount of collected data and presenting it in a way that made sense to the reader and captured the essence of what the data revealed. In addition, the researcher performed an extensive review of the demographic traits of the participants (age range, branch of service, rank, education, and years at the organization) and did not discover any significant relations on how participants responded, in explaining the findings. Only one participant tied his age to his decision to limit himself on using modern-day technologies like smart phones, texting students, or using Microsoft Outlook calendar feature as a day planner.

The findings of this study have important implications for educators and program leaders involved in health service research. This study anticipates adding to the literature, a valuable version of the adoption and integration constructs specifically with respect to the acceptance of instructional technologies. In addition, this case study presents empirical support that outlines factors such as internal and external organization environments, compatibility, and reliability which has influence on faculty members' use of instructional technology.

CHAPTER V: CONCLUSION AND RECOMMENDATIONS

The purpose of this case study was to explore with a sample of military medical faculty members their perception of what factors facilitated or inhibited their adoption of instructional technology. The conclusions from this study follow the research questions and the findings and therefore address three areas: (a) what factors inhibited or facilitated the adoption of instructional technology at the IPAP, (b) how has instructional technology evolved over the last two years at the IPAP, and (c) what is the role of program leaders in the integration and adoption of instructional technologies as perceived by IPAP faculty members.

This chapter summarizes the conclusions reached in the study, as well as suggests recommendations, and implications for future research. This study was guided by concepts described by Rogers' diffusion of innovations theory. Rogers (2003) innovation-diffusion theory provided an approach to discussing the differences between early adopters of technology and those who tend to be *laggard*. His concepts that explained the adoption of innovative technologies coupled with the review of literature from Chapter 2 provided the researcher with a framework to interpret and analyze the findings of this study. Moreover, the researcher followed accepted grounded theory data analysis procedures throughout this study.

What Helps or Hinders the Adoption of Instructional Technologies

The findings indicated that most IPAP faculty members are ready to adopt instructional technologies into their curriculum. The stages of adoption and integration-decision process model used in this study were essentially an application of Rogers' (2003) five variables determining the rate of adoption concept. Although Rogers' study of innovative technology adoption looked at this phenomenon “over time,” this case study was based on a particular “point in time” within a two year window at the IPAP.

From the majority of participants, infrastructure, training, professional development, time commitments, technical support, and hardware devices were factors that can influence their use of instructional technologies. Insufficient infrastructure to support software applications and network usage ranked high as one of the reasons for not using instructional technologies like testing students on *Blackboard*. Lack of training also featured high as an impediment to instructional technology adoption. The AMEDD (Army Medical Department) Center and School conducts some technical training courses, but no formalized training currently exist for the type of instructional technology software being used by the IPAP. In addition, DOIM and its customers (such as the IPAP) lacked effective channels of communication concerning computer networks, firewall blockage, and other security measures that slow down or impede instructional technology use in medical education.

Past and present leadership at the IPAP have always sought to maintain the program standing as one of the top ranking physician assistant programs in the United States. One way that current IPAP leadership is preparing its program for the future is through the use of innovative technologies. However, this proactive behavior by IPAP leadership seemed to be missing a few factors that would have made the transition seamless, that being the barriers described in the findings.

Infrastructure, Training, and Leadership: Essentials for Technology Adoption

This study found that faculty members depend on their own motivation, attitudes, skills, interest, and background knowledge to increase the adoption rate of instructional technology. These internal views coupled with external factors affected the adoption of new technologies introduced at the IPAP over the last two years. Martin (2003) found that faculty will adopt technology sooner if their apprehensions and concerns are addressed early on during the integration process. It appears that some efforts were made by leadership to involve faculty decision; namely, listening to their recommendations pertaining to technology purchases. The problem lies in the type of instructional technology purchased over the last two years and whether it met the mission of the organization. Rogers (2003) perceived characteristics of innovations, (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability, are factors that should be considered when selecting new technologies. Rogers's adoption theory suggests that personal and social characteristics of potential adopters affect their decision process to adopt or reject new innovation. According to Rogers, if any of these five characteristics of innovations are considered, they help affect the degree and rate of adoption of technological innovations.

IPAP leadership said that they listened to faculty members' suggestions, although that did not appear to be the perception of some of the faculty members. Some faculty stated that their opinions were not asked about purchasing software that was compatible to existing software. They explained that the lack of compatibility resulted in extra work transferring their curricula into the new technology format. Other faculty members felt that infrastructure demands, training, and technical support were not considered before mandatory start dates were set by program leaders. Also, some faculty members noted that there were no question and answer sessions that might have quelled some of the anxiety and frustration in the organization.

Some faculty members pointed out that attempts have been made by program leaders to train them on *Blackboard*. The timeframe provided for training, however, clashed with the December holiday period and yielded poor attendance.

The majority of participants' responses during face-to-face interviews showed that they were eager to learn and use the technologies available at the IPAP. Still, the overall majority of the staff considered instructional technology a key element in future development of their curriculum. To maintain the reputation of being one of the finest physician assistant programs in the country, the barriers to technology adoption and integration must be addressed, starting with infrastructure and training. These two factors interacted with each other and shaped the adoption of instructional technology as illustrated in figure three (Model of Essential Elements for Successful Adoption of Technology at the IPAP). The following section provides details regarding this model, and helps explain how various factors found in this study interact with each other to affect adoption rate of technology by IPAP faculty members.

Based on research from this study, the researcher proposes a model of essentials for successful instructional technology adoption (see Figure 3). Leadership was the guiding force for instructional technology change at the IPAP over the past two years. The arrows illustrate that the vision of the program leader is to make the program a paperless learning environment. The core of the model depicts the introduction of instructional software integrated into the IPAP curricula (this could represent any form of new technology being introduced to an organization). Essential elements for successful adoption of technology at the educational facility are: (a) time, (b) training and professional development, (c) instructional technology software, (d) human factor, (e) technical support, (f) infrastructure and, (g) hardware devices. The two primary elements in this model are training and infrastructure. They represent the key findings of that study that had some influence on the integration of instructional technology at the IPAP. These two factors should be considered when introducing any form of technology into an organization. As described by Zayim et al. (2006), training and infrastructure are prerequisite to instructional technology adoption. The model shows that these two factors are affected by a number of external factors and conditions such as: time, professional development, hardware, and technical support. Because time has been shown to be a scarce resource for faculty at the IPAP, it is positioned above training in the model, but linked to show its important relationship to training. Without a set timeframe for training, an organization may find it difficult to establish a training program that is comprehensive enough to meet its goals. Both time and professional development are linked to training because they are all interconnected and require faculty participation. Faculty training can range from formalized well organized courses to a single brief peer supported training session to introduce a new technological innovation.

Throughout this study technical support has been shown to be an essential component in the adoption of technology process. Technical support includes the availability of competent technical staff and instructional design support for technology integration. Hardware resources are linked to the infrastructure and include up-to-date hardware, servers, network capabilities, Wi-Fi (wireless), laptops and peripherals.

Following the model through its progression, training and infrastructure were both required to successfully integrate technology. If little attention is paid to these areas or to the outside factors and conditions, then the adoption of technology may be reduced. The human factor illustrates enthusiasm for technology or resistance to change. This study found that an early majority of faculty members were optimistic about adopting instructional technology. However, some members appeared to have no interest in adopting certain instructional technology at the IPAP. An internal factor such as personal resistance to change was observed by one participant, while others felt that external factors presented barriers to their adoption. External factors include the need for training and support, the need for ease of use and reliability of technology equipment, and the need to reduce perceived failure.

The leadership of the IPAP is dedicated to integrating current and emerging technologies into their curriculum. The majority of participants considered leadership to be a constructive guiding force toward influencing faculty members to adopt instructional technology at the IPAP. However, half of the participants felt that factors such as infrastructure, training, technology capabilities, technical support, and data security were areas of deficiency by leadership.

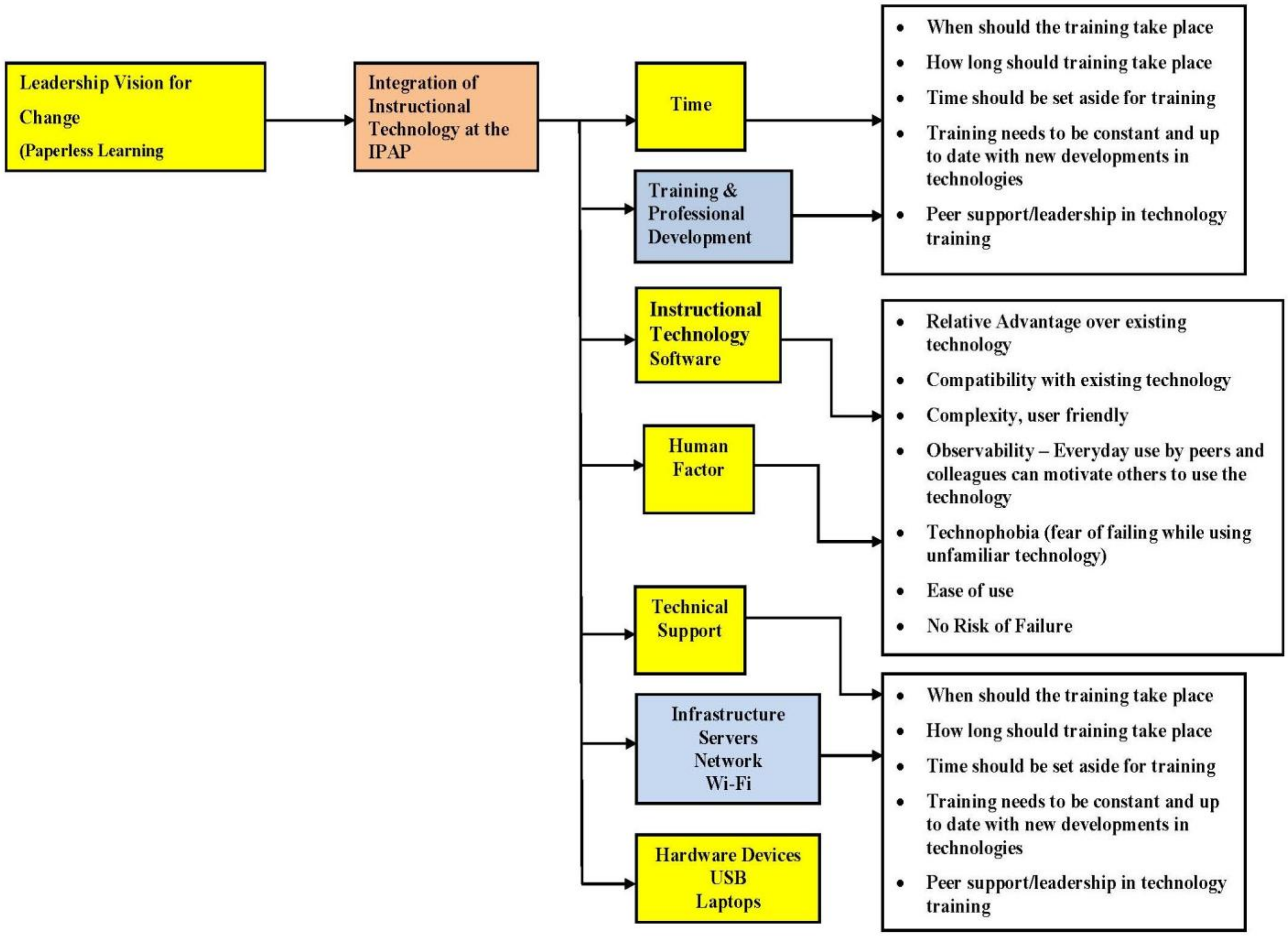


Figure 3. A Model of Essential Elements for Successful Adoption of Technology at the IPAP

Recommendations

The following recommendations are based on the major findings of this study and a review of literature that corresponds with this research.

Recommendation for Training and Professional Development

The process by which the IPAP has introduced instructional technologies into its curriculum has not been welcomed with open arms by all faculty members. In the findings, participants noted that neither ongoing structured training nor infrastructure to adequately support the training (e.g., *Blackboard*) has been developed to assist them in coping with change to their teaching strategies.

1. Set aside specific dates and times to conduct training and professional development. Faculty members should have backing, support, and time to explore new instructional technology methods. In addition, ongoing professional development should be offered to familiarize personnel with emerging instructional technologies.
2. Current and future program leaders may have to look at extending the physician assistant program curricula to accommodate build-in staff development training times. The added timeframes could be one week at the end of each trimester. The logistics of extending a military training program that has multiple branches of service as stakeholders could create a bureaucratic nightmare. Extending the program must be approved by layers of bureaucracies that expect fully trained physician assistants to fill empty positions at a particular point in time. Extending the physician program in the military is challenging because the second phase of training for students is located at 19 different sites across the

United States, whereas civilian physician assistant schools usually have both phases of training near their university. This recommendation is feasible, but will require additional negotiations between each branch of service higher authority leadership.

3. Encourage peer-to-peer mentorship training by supporting instructors with limited experience of the new technology with colleagues who have been successful with that particular technology. Peer-to-peer support can contribute to faculty members interacting with various forms of recently introduced technologies, thus increasing the adoption rate. According to Keengwe, Kidd, and Kyei-Blankson (2009), "faculty were more likely to use technology if they had departmental and peer support, cross collaboration with other faculty using technology, and if there was a reward program in place to attract and motivate them" (p. 25). Rogers (2003) found that peer-to-peer relations technology support creates an environment that causes technology to be widely used.

4. Develop a technology Personnel Qualification Standards (PQS) check-in process to have new faculty members obtain minimum knowledge and skills necessary to operate existing and emerging instructional technologies used at the IPAP. The PRS should not be a stand-alone training program but should complement other professional development practices.

Recommendation for Infrastructure and Technical Support

Increased use of technology in any organization requires an infrastructure that can support it. As the student population and technology use grows at the IPAP, leaders and administrators involved in the technology integration process should prepare for the expansion. During the planning stage of implementing new instructional technologies, the following recommendations should be considered:

1. The (AMEDD) Army Medical Department Center and School has to provide sufficient infrastructure and technical support to meet the demands of an expanding technology based-curriculum being integrated at the IPAP. A comprehensive needs assessment evaluation of the infrastructure is required to determine the bandwidth usage by all IPAP stakeholders. Review and enhance AMEDD C&S servers' capacity to meet the demands of current and future curriculum.
2. DOIM should review its policies on firewalls and site blockage, as well as improve communication channels between its customers like IPAP. Communication dialogue between program leaders, administrators, and infrastructure managers will provide a better understanding of the complexities each stakeholder endures in running a medical training program and a government-military network system that requires various security concerns.
3. DOIM, AMEDD, and the IPAP should implement policies that promote efficient processes for integrating technology; for example, priority given to IPAP students' access codes for laptop use.
4. For successful integration of instructional technology, staffing should include technical support personnel that are competent in both forms of hardware and software technologies. A competent technician that is trained to troubleshoot IPAP technology, deal with infrastructure networking issues relevant to the IPAP, and possess the ability to coordinate technical support issues with DOIM that best serve both organizations.

Recommendation for Program Leaders

1. Program leaders should enable faculty members to "be all that they can be" through ongoing training and professional development with technology. All participants in this study maintain their professional licenses and skills through continuing medical education (CME); however, adding training and professional development to technology integration is just as important. In a world where educators are the digital minorities and students are the digital majority it is paramount to equalize this imbalance. Providing training that keeps faculty members abreast of current instructional technologies being used or those in the planning stage will benefit all involved stakeholders.
2. It is important that program leaders remember the focus should not be to provide technology first; the focus should be to provide training to the faculty first or at least procurement of technology and faculty training should be considered in the same thought process. Leaders must also seek ways to provide curricular support to faculty members. Faculty members need professional development on integrating technology plus knowledgeable instructors or peer leaders to guide others in integrating instructional technologies.
3. Infrastructure and support are critical elements in integrating technologies. As student enrollment and the use of technology increases in the PA program, the AMEDD Center and School has to address the technological needs of its tenant commands. The infrastructure must be able stay ahead of advancing technologies.

Suggestions for Further Research

The research focused on examining the adoption of instructional technology at the Interservice Physician Assistant Program. This case study has proposals for integration of new instructional technologies into a military medical learning environment. The study identified that leaders involved in key changes, such as integrating instruction technologies into areas that previously required paper, must be resolute. Leaders must be continuously committed and attentive to critical phases during the evolution. They must set direction and develop a vision and strategies throughout the process.

This research suggest that factors that contribute to faculty member's readiness to adopt instructional technology at the IPAP can be attributed to two main issues: (a) *Training* which includes time commitment and professional development, and (b) *Infrastructure* which includes hardware and software capabilities and technical support (see Figure 2). From the findings of this study, recommendations for future research include the following:

1. Conduct a similar study that examines the role of both opinion and peer leadership during technology change. Rogers (2003) describes two types of leadership as it applies to adopting technology: (a) Peer leadership where people innovate and learn from each other to increase their proficiency with instructional technology, and (b) opinion leadership "the degree to which an individual is able to influence other individuals' attitudes or overt behavior informally in a desired way with relative frequency" (Rogers, 2003, p. 27). The researcher could examine the perceived influence that these two types of collegial leaderships have in influencing the level of instructional technology adoption.

2. Future research is needed to examine the involvement of end users in planning for instructional technology change processes. The researcher could collect data concerning faculty member's involvement in the decision process and discover if their attitudes or values change due to their involvement in the decision process. The researcher can also examine if the instructional technology adoption rate will either increase or decrease based on faculty members' participation in the planning process.
3. Conduct a similar study centering on leadership vision for change in a technological learning environment. In-depth personal interviews and surveys from educational leaders could provide data that examines transformational changes associated with technology, and its perceived influence on faculty. By using in-depth interviews coupled with surveys, the researcher could closely examine factors that affect the change process.
4. While this study examined factors influencing faculty adoption of instructional technology using qualitative research, further research is needed using both qualitative and quantitative research to determine the extent to which variables can predict the rate of instructional technology adoption by faculty members. Due to the small number of participants in this study, a larger sample size would benefit quantitative research and allow investigation of the interrelationship among these variables. Variables such as: (a) demographic (age, education level, gender, length of service, years of teaching experience), (b) perceived leadership influence, (c) training and professional development, (d) human factors, (e) technical support, and (f) infrastructure.

5. Conduct a similar study possibly in a different medical context or a similar adult educational organization; for example, a military-like organization such as the F.B.I. academy at Quantico. Future researchers can look at and compare methods of instructional technology integration and adoption by law enforcement instructors.
6. Conduct a similar study focusing on students perceived views on faculty member's use of instructional technology and its influence on their learning.

In conclusion, future research involving a larger sample size could provide a clearer description of instructional technology use and adoption by educators in medical training by incorporating both quantitative and qualitative (mixed methods) research designs. According to Creswell (2005), "the combination of both forms of data provides a better understanding of a research problem than one type of data alone" (p. 53).

Researcher Reflections

Having an opportunity to meet the staff at the IPAP provided the researcher with an opportunity to see firsthand some of the characteristics exhibited by leaders involved in technology integration. While researching this case study, the researcher found answers to some questions that he pondered while developing his research title. Questions like: What is expected of a program leader when integration new instructional technology into a program, and how does a program leader influence the adoption of technology in a military medical learning environment?

The expectation of leadership involved in technology integration is to lead faculty members into an educational environment that benefits both teachers and students. Leadership's role should be to ask questions that reveal limitations, doubts, erroneous beliefs, and inaccuracies of existing solutions. This approach will open dialogue to deal with factors that either create or may create barriers to integrating new technologies. As a clinical educator who will soon make the transition from clinical and teaching duties to more educational administrative duties, it was valuable to observe a higher education program like the IPAP transitioning to a paperless environment. The perils and difficulties experience by the staff during this transition provided the researcher with a step-by-step model or guide to implement technological changes. Both negative and positive findings can be used to assist future leaders involved in integrating technology into their organization.

As noted throughout this study, previous researchers identified the importance of having strong leadership support when technology integration initiatives are implemented. Occasionally military leaders have to go through many layers of bureaucracy to get things done. Hence, the researcher discovered that a good leader must be a visionary who possesses immediate and long range planning and assessment skills. Besides being able to maneuver through multiple layers of bureaucracy when implementing changes, the program director must be able to wear multiple hats. They must be able to organize, plan, and implement a policy that will affect an organization for many years. The irony is that quite often IPAP leaders are usually not around to see the outcome of their major decisions due to rotation transfers or retirement. Therefore, decisions must be made wisely because they can produce long term consequences that can have an effect on an organization academic standing and reputation for years to come.

Chapter Summary

Based on the population size of 27 faculty members in this case study, the use of qualitative methodology was beneficial in uncovering the perceptions of faculty members' experiences when considering adopting various types of instructional technology. The researcher's ability to interview over half the staff at the IPAP provided an abundance of rich descriptive data. In addition, the use of existing literature regarding technology adoption in education helped convey the findings into perspective. The adoption of technology concepts provided by Rogers' Diffusion of Innovations were used as a conceptual model in Chapter 2 to assist in describing the perceived attributes of faculty members in their rate of adopting instructional technologies. From this conceptual model, the researcher was able to visualize and develop a theory that identified factors that created barriers to the successful adoption of instructional technology. Barriers included: (1) lack of personal knowledge and skills by faculty and students, (2) lack of effective training and professional development related to programs on technology, (3) lack of technical support, (4) software capability, (5) infrastructure, (6) discomfort with technology and lack of motivation to change, and (7) a need by leadership to periodically analyze and review the need requirements for change. The overall implication of the findings was that the majority of faculty at the IPAP was aware of the benefits of integrating instructional technology into their curriculum. The physician assistant program has some processes in place; however, significant areas within the technology structure will impede successful integration of key course management software, which if not addressed could lead to a lower adoption rate and a less effective program.

The study contributed to the understanding of the nature of technology integration of one of two military physician assistant programs in the world. The other program located in Canada was recently awarded degrees to their military physician assistants in 2009. The researcher is optimistic that the knowledge gained from this study could be used to assess and produce changes in how instructional technology may be integrated into medical training programs. The study also contributed to the body of literature about instructional technology use in military medical learning environments.

References

Albright, M. J. (February 5, 1996). Instructional technology and higher education: Rewards, rights, and responsibilities. *Keynote Address at the Southern Regional Faculty and Instructional Development Consortium*, Baton Rouge, LA. (ERIC Document Reproduction Service No. ED 392412)

American Academy of Physician Assistants (AAPA). (2008, March 20). *What is a PA?* Retrieved from http://www.aapa.org/geninfo1.html.

Ansari, M. A. (1990). *Managing people at work: Leadership styles and influence strategies*. New Delhi, India: Sage Publications.

Ayer, S., & Smith, C. (1998). Planning flexible learning to match the needs of consumers: A national survey. *Journal of Advanced Nursing, 27*, 1034-1047.

Bailey, D. (1998, Fall). *Telemedicine at sea*. Retrieved April 21, 2010 from, http://www.chips.navy.mil/archives/98_oct/Telemed.htm

Baker, E. L., & O'Neil, H. F. (2003). Evaluation and research for technology: Not just playing around. *Evaluation and Program, 26*, 169-176. doi: 10.1016/50149-7189(03)00008-9.

Baltes, P. B., & Lindenberger, U. (1997). Emergence of a powerful connection between sensory and cognitive functions across the adult life span.: A new window to the study of cognitive aging. *Psychology and Aging, 12*(1), 12-22.

Barnett, O. G. (1995). Information technology and medical education. *Journal of the American Medical Informatics Association, 2*(5), 285-291.

Bass, B. M. (1990), *Bass & Stogdill's handbook of leadership: Theory, research and managerial applications* (3rd ed.). New York, NY: Free Press.

Bass, B. M., & Avolio, B. J. (1997). *Full range leadership development: Manual for the multifactor leadership questionnaire*. Palo Alto, CA: Mind Garden.

Bender, B. (October 20, 2005). U.S. military struggles to recruit medical professionals: Goal missed for scholarship applications. *The Boston Globe*, p. A12.

Bergmann, S., & Brough, J. A., (2007). *Lead me, I dare you!: Managing resistance to school change*. Larchmont, NY: Eye on Education.

Berman, P., & McLaughlin, M. W. (1978). Federal programs supporting educational change. Vol. VIII: *Implementing and sustaining innovations*. Santa Monica, CA: Rand Corporation.

Bernard, R. H. (2002). *Research methods in anthropology: Qualitative and quantitative methods* (3rd ed.). Walnut Creek, CA: Alta Mira Press.

Bernard, R. H. (2006). *Research methods in anthropology: Qualitative and quantitative methods* (4th ed.). Oxford, UK: Alta Mira Press.

Blackboard. (2010). Introduction the Blackboard learn + toolbar. Retrieved from http://www.blackboard.com/

Blascovich, J. J., & Hartel, C. R. (Eds.). (2008). *Human behavior in military contexts: Committee on opportunities in basic research in the behavioral and social sciences for the U.S. military*. Washington, D.C.: The National Academies Press.

Bloomberg, L. D., & Volpe, M. (2008). *Completing your qualitative dissertation: A roadmap from beginning to end.* Los Angeles: Sage Publications.

Bogdan, R. C., & Biklen, S. K. (1982). *Qualitative research for education: An introduction to theory and methods*. Boston: Allyn and Bacon, Inc.

Bohen, J. (2006). *Follow the evidence*. Retrieved from http://www.tcbmag.com/industriestrends/healthcare/72399p1.aspx.

Botwinick, J. (1967). Cognitive process in maturity and old age. New York: Springer.

Botwinick, J. (1977). Intellectual abilities. In Birren J. E., Schaie, K. E. (Eds.), *Handbook of the psychology of aging* (pp. 49-53). New York: Van Nostrand Remhold.

Bradley, J. (1993). Methodological issues and practices in qualitative research. *Library Quarterly, 63*(4), 431-449.

Bradley, T., & Fowler, S. G. (2001). Taming the beast of information overload. *Foundation News & Commentary, 42*(4), Retrieved from http://www.foundationnews.org/CME/article.cfm?ID=1003.

Brandyberry, A. A. (2003). Determinants of adoption for organizational innovations approaching saturation. *European Journal of Innovation Management, 6*(3), 150-158.

Bringer, J. D., Johnston, L. H., & Brackenridge, C. H. (2006). Using computer-assisted qualitative data analysis software to develop a grounded theory project. *Field Methods*, *18*(3), 245-266. doi. 10.1177/1525822X06287602.

Bruce, S. R., & Vermakis, D. S. (1996), Military leadership is not a dirty word. *The Journal of Leadership Studies, 3*(3), 72-80. doi: 10.1177/107179199700300308.

Buck, J. H., & Horton, B. P. (1996). Who's using what and how often: An assessment of the use of computer technology in the classroom. *Florida Journal of Education Research, 36*(1), 47-61.

Buckenmeyer, J. (2008). Revisiting teacher adoption of technology: Research implications and recommendations for successful full technology integration. *College Teaching Methods & Styles Journal*, *4*(6), 7-10.

Burns, N., & Grove, S. K. (1993). *The practice of nursing research: Conduct, critique, and utilization* (2nd ed.). Philadelphia: W.B. Saunders.

Canada (2005). *Leadership in the Canadian forces: Conceptual foundations*. Lingston: Department of National Defense (DND). Retrieved from http://www.cda-acd.forces.gc.ca/cfli-ilfc/lea/conc/tab-eng.asp

Carr, V. H. (1999). *Technology adoption and diffusion*. Retrieved from http://www.au.af.mil/au/awc/awcgate/innovation/adoptiondiffusion.htm

Cavanaugh, J. (2005). Teaching online. A time comparison. *Online journal of Distance Learning Administration*, *8*(1). Retrieved from http://www.westga.edu/~distance/ojdla/spring81/cavanaugh81.htm

Center for Leadership Studies. (2002). *LEAD: Leadership style perception of self.* Retrieved from http://www.cadnstuff.com/edlead/lead.htm

Chaffee M. W., & Mills, M. E. (2001). Navy medicine: A health care leadership blueprint for the future. *Military Medicine*, *166*(3), 240-247.

Chambers, J. W. (1991). The new military history: Myth and reality. *Journal of Military History, 55*(3), 395-406.

Chance, P. L., & Chance, E. W. (2002). *Introduction to educational leadership & organizational behavior: Theory into practice.* Lachmont, NY: Eye on Education.

Chapman University (n.d.). *Academics - Blackboard.* Retrieved April 21, 2010, from http://www.chapman.edu/Blackboard

Choudrie J., & Dwivedi, Y. K. (2005), Investigating the research approaches for examining the technology adoption in the household, *Journal of Research Practice, 1*(1), 1-12, Retrieved April 21, 2010, from http://jrp.icaap.org/index.php/jrp/article/view/4/7.

Chumley, H. S., Dobbie, A. E., & Delzell, J. E. (2006). Case-based exercises fail to improve medical students' information management skills: A controlled trail. *BMC Medical Education, 6*(14), 1-6. doi: 10.1186/1472-6920-6-14.

Collinson, V. (2001). Intellectual, social, and moral development: Why technology cannot replace teachers. *Journal, 85*(1), 35-45, University of North Carolina Press.

Cook, B. R. (1992). *Situational leadership styles of Air Force commanding officers*. Unpublished doctoral dissertation, University of La Verne, La Verne, CA.

Corbin, J. M., & Strauss, A. L. (2008). *Basics of qualitative research* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Costello, R. W. (1997). The leadership role in making the technology connection. *T.H.E. Journal, 25*, 58-62.

Creighton, T. (2003). *The principal as technology leader*. Thousand Oaks, CA: Corwin Press, Inc.

Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd ed.). Columbus, OH: Pearson Prentice Hall.

Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Crooks, S. M., Yang, Y., & Duemer, L. S. (2003). Faculty perceptions of web-based resources in higher education. Journal of Educational Technology Systems, 3(12), 102-113.

Cuban, L. (1999). The technology puzzle. *Education Week*, 18(43), 68-69.

Daly, J. E. (1997). Hypertext links to learning: Roadblocks and obstacles along the information super highway. *Journal of Educational Technology Systems, 26,* 309-314.

Darnall, C. R. (2009). Interservice physician assistant program. Retrieved April 21, 2010 from, http://www.crdamc.amedd.army.mil/default.asp?page=pat.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly, 13*(3), 319-339.

Davis, F. D., Bagozzi, R. P., Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*, 982-1002.

De Lorenzo, R. A. (2008). San Antonio military medicine center integration: A case study in organizational leadership design, *Military Medicine, 173(2),* 203-209.

Denis, J. L., Hebert, Y., & Langley, A. (2002). Explaining diffusion patterns for complex health care innovations. *Health Care Management Review, 27*(3), 60–73.

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of qualitative research*. Thousand Oaks, CA: Sage Publications.

Duxbury, L., & Corbett, N. (1996). Adoption of portable offices: An exploratory analysis. *Journal of Organizational Computing & Electronic Commerce, 6*(4), 345-363.

Elwyn, G. J., & Lewis, M. (1998). The aftermath of the Bristol case: Poor performers will need remedial training. *British Medical Journal, 318*(7187), 816.

Fichman, R. G. (2000). The diffusion and assimilation of information technology innovations. In R. W. Zmud (Ed.), *Framing the domains of IT management. Projecting the future through the past* (pp. 195-128). Cincinnati, OH: Pinnaflex Educational Resources Inc.

Fiedler, F. E. (1973). The contingency theory and the dynamics of leadership process. *Advances in Experimental Social Psychology, 11*, 60-112.

Fiedler, F. E. (1974). The contingency model: New directions for leadership utilization. *Journal of Contemporary Business, 3*(4), 65-80.

Filipczak, B. (1997). Are you wired enough? *Training, 34*(12), 25-39.

Fletcher, J. D. (1990). *The effectiveness of interactive videodisc instruction in defense training and education*, IDA Paper P-2372. Institute for Defense Analyses, Alexander, VA.

Fletcher, J. D., Hawley, D. E., & Piele, P. K. (1990). Cost effects, and utility of microcomputers assisted instruction in the classroom. *American Educational Research Journal, 27*(4), 783-806. doi: 10.3102/00028312027004783.

Frank, K. A., Zhao, Y., & Borman, K. (2004). Social capital and the diffusion of innovations within organizations: Application to the implementation of computer technology in schools. *Sociology of Education*, *7*, 148-171 Retrieved from https://www.msu.edu/~kenfrank/papers/Social%20Capital%20and%20the%20Diffusion%20of%20Innovations%20within%20schools,%20accepted.pdf.

Frazier, M., & Bailey, G. D. (2004). *The technology coordinator's handbook*. Eugene, OR: International Society of Technology in Education.

Fullan, M. (2001). *Leading in a culture of change*. San Francisco: Jossey-Bass.

Fullan, M., & Stiegelbauer, S. (1991). *The new meaning of educational change*. New York, NY: Teachers College Press.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.). New York, NY: Longman.

Garrison, D. R., & Akyol, Z. (2009). Role of instructional technology in the transformation of higher education. *Journal of Computing in Higher Education, 21*(1), 19-30. doi: 10.1007/s12528-009-9014-7.

Glaser, B. G. & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine Transaction.

Goleman, D., Boyatzis, R. E., & McKee, A. (2002). *Primal leadership: Learning to lead with emotional intelligence*. Boston, MA: Harvard Business School.

Gordon, D. (September 7, 1997). Military medicine: Doing more with less. *The Virginia Pilot*, p. A 6.

Gjerde, C. L., Pipas, C. F., & Russell, M. (2004). Teaching of medical informatics in UME-21 medical schools: Best practices and useful resources. *Family Medicine, 36,* Spring/Supplement, 68-73.

Graesser, A. C., & King, B. (2007). Technology-based training. *Human Behavior in Military Contexts*. Washington, DC: The National Press.

Gregoratos, G., & Miller, A. B. (1999). 30th Bethesda Conference: The Future of Academic Cardiology. Task force 3: teaching. *Journal of the American College of Cardiology, 33*(5), 1120-1127.

Grey, K. C. (2001). Teachers' perceptions of innovation adoption. *Action in Teacher Education, 23*(2), 30-35.

Guba, E. G., & Lincoln, Y. S. (1998). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The landscape of qualitative research: Theories and issues* (pp.195-220). Thousand Oaks, CA: Sage Publications.

Guest, G. F. (1999). Internet resources for dentistry: Utilization of the Internet to support professional growth, decision making, and patient care. *Journal of Contemporary Dental Practice*, *1*(1), 31-35.

Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice, 8*(2/4), 381-391. doi: 10.1080/135406002100000512

Haluck, R. S., & Krummel, T. M. (2000). Computers and virtual reality for surgical education in the 21st century. *Achieves of Surgery, 135*, 786-791.

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review, 9*(2), 193-206.

Harvey Cardiac Patient Simulator. (n.d.). Retrieved from http://library.nymc.edu/HARVEY/harvey.cfm

Hersey, P., & Blanchard, K. H. (1976). *Situational leadership.* Columbus: Ohio State University, Center for Leadership Studies.

Hersey, P., & Blanchard, K. H. (1988). *Management of organizational behavior: Utilizing human resources* (5th ed.). Englewood Cliffs, NJ: Prentice Hall, Inc.

Hersey, P., Blanchard, K.H., & Johnson, D.E. (2001), *Management of organizational behavior: Leading human resources* (8th ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

Hersey, P., Blanchard, K. H., & Johnson, D. E. (2008). *Management of organizational behavior: Leading human resources* (9th ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

Hesselbein, F., Cavanagh, R. E., & Shinseki, E. K. (2004). *Be, know, do*. San Francisco, CA: Jossey-Bass.

Hilty, D. M., Benjamin, S., Briscoe, G., Hales, D. J., Boland, R., Luo, J. S., Chan, C. H., Kennedy, R. S., Karlinsky, H., Gordon, D. B., Yellowlees, P. M., & Yager, J. (2006). APA summit on medical student education task force on informatics and technology: Steps to enhance the use of technology in education through faculty development, funding and change management. *Academic Psychiatry*, *30*(6), 444-450.

Horn, R. Jr., (2002). *Understanding educational reform: A reference handbook*. Santa Barbara, CA: ABC-CLIO, Inc.

IES National Center for Education Statistics (n.d.). *Technology integration*. Retrieved from http://nces.ed.gov/pubs2005/tech_suite/part_8.asp.

Interservice Physician Assistant Program (IPAP) (2004). Extract from Web Bulletin, Retrieved from http://www.samhouston.army.mil/ipap/program/program.htm.

Kaila, H. L. (2005). *Human resource management volume two*. Delhi: Kalpaz Publications

Katz, R. N., & Salaway, G. (2004). *Information technology leadership in higher education: The condition of the community*. Retrieved April 21, 2010, from http://net.educause.edu/ir/library/pdf/EKF/ekf0401.pdf.

Kearsley, G., & Lynch, W. (1994). *Educational technology: Leadership perspectives.* Englewood Cliffs, NJ: Educational Technology Publications, Inc.

Keengwe, J., & Anyanwu, L. (2007). Computer technology-infused learning enhancement. *Journal of Science Education and Technology*, *16*(5), 387-393. doi: 10.1007/s10956-007-9067-1.

Keengwe, J., Kidd, T., & Kyei-Blankson, L. (2009). Faculty and technology: Implications for faculty training and technology leadership. *Journal of Science Education and Technology, 18*(1), 23-28. doi: 10.1007/s10956-008-9126-2.

Kendall, J., Tung, L. L., Chua, K. H., Ng, C.H.D., & Tan, S. M. (2001). Electronic commerce adoption by SMEs in Singapore. *Proceedings of the 34th Hawaii International Conference on System Sciences.* Retrieved from http://portal.acm.org/citation.cfm?id=821977.

Kirby, R. L. (1987). The GPEP report on undergraduate medical education: implications for rehabilitation medicine: Association of American Medical College Panel on the General Professional Education of the Physician. *American Journal of Physical Medicine and Rehabilitation*, *66*, 184-191.

Knowles, M., & Associates. (1984). *Andragogy in action: Applying modern principles of adult education*. San Francisco: Jossey Bass.

Kolenda, C. D. (2000). Technology, leadership and effectiveness. *Military Review, 80*, 87-91.

Koontz, H., O'Donnell, C., & Weihrich, H. (1984). *Management* (8th ed.). Singapore: McGraw-Hill.

Kotter, J. P. (1988). *The leadership factor*. New York, NY: Free Press.

Krosnick, J. A. (1988). Attitude importance and attitude change. *Journal of Experimental Social Psychology, 24*, 240-255.

Kurtz, G., Oved, R., Rosenberg, N., & Neuthal, T. (2007). *Toward online teaching: The transition of faculty from implementation to confirmation at Bar-Ilan University*. Chais Research Center for the Integration of Technology in Education Raanana: Open University in Israel, 85-92.

Lin, C. (2009). Data management and security in qualitative research. *Dimensions of Critical Care Nursing, 28*(3), 132-137.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Beverly Hills, CA: Sage.

Louis, K. S. & Miles, M. B. (1990). Improving the urban high school, what works and why. New York: Teachers College Press.

Lunenburg, F. C., & Irby, B. J. (2008). *Writing a successful thesis or dissertation: Tips and strategies for students in the social and behavioral sciences.* Thousand Oaks, CA: Corwin Press.

Martin, M. (2003). *Factors influencing faculty adoption of web-based courses in teacher education programs within the State University of New York.* (UMI No. 3089087). Dissertation Abstract International, *64*(04A), 1223

Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research, 2*, 173-191.

MacIntyre, A. (2008). Attitudes. In B. Horn & R. W. Walker (Eds.), *The military leadership handbook* (pp. 15-30). Toronto: Dundurn Press.

Manasse, A.L. (1984). Principals as leaders of high-performing systems. *Educational Leadership, 41*(5), 42-46.

Marquardt, M. J., & Kearsley, G. (1999). *Technology-based learning: Maximizing human performance and corporate success*. New York, NY: St. Lucie Press.

Margo, J., Dixon, M., Pearce, N., & Reed, H. (2006). *Freedom's orphans: Raising youth in a changing world*. London: Institute for Public Research.

Martich, G. D., Waldmann, C. S., & Imhoff, M. (2004). Clinical informatics in critical care. *Journal of Intensive Care Medicine, 19*, 154-163. doi: 10.1177/0885066604264016.

McCaney, K. (2010, February 19). DOD Lifts Ban on USB Drives [Defense Knowledge Technologies and Net-Centric Warfare]. Retrieved February 22, 2010, from http://www.defensesystems.com/Articles/2010/02/18/DOD-lifts-USB-drive-ban.aspx

McMaster, T., & Wastell, D. (2005). Diffusion- or delusion? Challenging an IS research tradition. *Information Technology & People, 18*(4), 383-403.

Merriam, S. B. (2002). *Qualitative research in practice: Examples for discussion and analysis*. San Francisco, CA: Jossey-Bass.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Mitchell, S. (1994). Technophiles and technophobes. *American Demographics, 16*(2), 36-41.

Montana, P. J., & Charnov, B. H. (2000). *Management* (3rd ed.). Hauppauge, NY: Barrow's Educational Series.

Mulford, B., Kendall, D., Edmunds, B., Kendall, L., Ewington, J., & Silins, H. (2007). Successful school leadership: What and who decides? *Australian Journal of Education, 51*(3), 228-246.

National Research Council, Modeling and Simulation, Vol. 4 of Technology for the United States Navy and Marine Corps: 2000-2035, Washington, D.C.: National Academy Press, 1997.

Noonan, S. J. (2003). *The elements of leadership: What you should know*. Lanham, MD: Scarecrow Press.

NVivo QSR International (2007, n.d.) Retrieved from http://www.qsrinternational.com/products_nvivo.aspx

Office of the Deputy Under Secretary of Defense for Readiness. (1996). *Military manpower training report: FY 1997.* Washington, DC: Department of Defense.

Osborne, J. W., Costello, A. B., Datta, A., & Shattuck, D. (2004). No school left behind: How school leadership and organizational factors can facilitate or inhibit adoption of instructional technology. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2004* (pp. 1339-1345). Chesapeake, VA: AACE. Retrieved from http://www.editlib.org/p/13661.

Ozuah, P. O. (2002). Undergraduate medical education: Thoughts on future challenges. *BioMed Central (BMC) Medical Education, 2*(8), 1-3. doi: 10.1186/1472-6920.2-8.

Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Newbury Park, CA: Sage.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Piemme, T. (1988). Computer-assisted learning and evaluation in medicine. *Journal of the American Medical Association, 260*(3), 367-372.

Polit, D. F., & Hungler, B. P. (1995). *Nursing research: Principles and methods* (5th ed.). Philadelphia, PA: Lippincott.

Prather, S. E., & Jones, D. N. (2003). Physician leadership: Influence on practice-based learning and improvement. *The Journal of Continuing Education in the Health Professions, 23 Spring Supplement,* 63-72.

Price, B. (2007). *Managing technology in our schools: Establishing goals and creating a plan*. Lanham, MD: Rowman & Littlefield Education.

Reifman, J., Gilbert, G. R., Fagan, L., & Satava, R. (2002). Military research needs in biomedical informatics. *Journal of the American Medical Association, 9*(5), 509-519. doi: 10.1197/Jamia.M1044.

Rogers, E. M. (1995). *Diffusion of innovation*s. (4th ed.). New York, NY: The Free Press.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: The Free Press.

Ruebling, C. E., Stow, S. B., Kayona, F. B., & Clarke, N. A. (2004). Instructional leadership: An essential ingredient for improving student learning. Educational *Forum, 68,* 243-253.

Russell, J. S., Mazzarella, J. A., White, T., & Maurer, S. (1985). *Linking the behaviors and activities of secondary school principals to school effectiveness: A focus on effective and ineffective behaviors.* Eugene, OR: University of Oregon, Center for Educational Policy and Management.

Saade, R., Nebebe, F., & Tan, W. (2007). Viability of the TAM in multimedia learning environments: A comparative study. *Interdisciplinary Journal of Knowledge and Learning Objects, 3*(1), 175-184.

Sandholz, J. H., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student-centered classrooms.* New York, NY: Teachers College Press.

Satava, R. M. (1995). Virtual reality and telepresence for military medicine. *Computers in Biology and Medicine, 25*(2), 229-236.

Schepers, J., Wetzels, M., & Ruyter, K. (2005). Leadership styles in technology acceptance: Do followers practice what leaders preach? *Managing Service Quality, 15*(6), 496-508. doi: 10.1108/09604520510633998.

Schillewaert, N., Ahearne, M. J., Frambach, R. T., & Moenaert, R. K. (2005). The adoption of information technology in the sales force. *Industrial Marketing Management, 34*(4), 323-336. doi: 10.1016/j.indmarman.2004.09.013.

Schram, T. H. (2003). *Conceptualizing qualitative inquiry*. Columbus, OH: Merrill Prentice Hall.

Schrum, L., Skeele, R., & Grant, M. (2002). One College of Education's efforts to infuse technology: A systemic approach to revisioning teaching and learning. *Journal of Research on Technology in Education, 35*(2), 256-271.

Seels, B., & Richey, R. (1994). *Instructional technology: The definition and domains of the field.* Washington DC: Association for Educational Communications and Technology.

Seidel, R. J., & Weddle, P. D. (2008). *Computer-based instruction in military environments*. New York: Plenum Press.

Sherry, L., Billig, S., Tavalin, F., & Gibson, D. (2000). New insights on technology adoption in schools. *T.H.E. Journal, 27*(7), 43-46.

Shortliffe, E. H. (1999). Medical informatics meet medical education. *Medical Technology,* 1(1), 1-3.

Slotte, V., Wangel, M., & Lonka, K. (2001). Information technology in medical education: A nationwide project on the opportunities of the new technology. *Medical Education, 35*, 990-995.

Society of Army Physician Assistants (SAPA). (1997, n.d.). Retrieved from http://www.sapa.org/

Spotts, T. H. (1999). Discriminating factors in faculty use of instructional technology in learning and teaching: the perceptions and experiences of teaching staff. *Educational Technology & Society, 2*(4), 92-99.

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Stakeholders. 2008. In *Merriam-Webster Online Dictionary*. Retrieved April 21, 2010, from http://www.merriam-webster.com/dictionary/stakeholders

Stapp, K. M. (2001). *Benefits and cost of distance learning: A perspective from the distance learning since 1995*. Department of the Army June 2001, TRADOC Analysis Center, White Sands Missile Range, NM.

Starratt, R. J. (1995). *Leaders with vision: The quest for school renewal.* Thousand Oaks, CA: Corwin Press.

Strauss, A., & Corbin, J. (1994). Grounded theory methodology. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 217-285). Thousand Oaks, CA: Sage Publications.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. (2nd ed.). Thousand Oaks, CA: Sage Publications.

Sugrue B., & Rivera, R. J. (2005). *State of the industry: ASTD's annual review of trends in workplace learning and performance*. Alexandria, VA: ASTD.

Sumner, M., Hostetler, D. (1999). Factors influencing the adoption of technology in teaching. *Journal of Computer Information System, 40*(1), 81-87.

Suppes, P., Fletcher, J. D., & Zanotti, M. (1976). Models on individual trajectories in computer-assisted instruction for deaf students. *Journal of Educational Psychology, 68*(2), 117-127. doi: 10.1037/0022-0663.68.2117.

Swanson, R. A., & Holton, E. F. (2005). *Research in organizations: Foundations and methods of inquiry.* San Francisco,CA: Koehler Publishers, Inc.

Taylor, R.L., & Rosenbach, W.E. (2005), *Military leadership: In pursuit of excellence*, Cambridge, MA: Westview Press.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*, 144-176.

Tornatzky, L. G., & Fleisher, M. (1990). *The processes of technological innovation*. New York, NY: Lexington.

Trotter, A. (1999). Preparing teachers for the digital age. *Education Week, 19*(4), 37-43. U.S. Department of Education, National Centre of Education Statistics.

Vander Zanden, J. W. (1977). *Social psychology*. New York, NY: Random House.

Vecchio, R. P., Bullis, R. G., & Brazil, D. M. (2006). The utility of situational leadership theory: A replication in a military setting. *Small Group Research, 37*, 407–424. doi: 10.1177/1046496406291560.

Vogt, W. P. (2005). *Dictionary of statistics and methodology: A nontechnical guide for the social science* (3rd ed.). Thousand Oaks, CA: Sage.

von Lubitz, D. K. J. E., Beier, K. P., Freer, J., Levine, H., Pletcher, T., Treloar, D., Wilkerson, W., & Wolf, E. (2001). *Simulation-based medical training: The medical readiness trainer concept and the preparation for civilian and military medical field operations.* Retrieved from http://www.med-smart.org/downloads/MEDICAL_TRAINING-LAVAL_CONF.pdf.

Watson, C. A. (2007). *Military education*. Westport, CT: Praeger Security International.

Weiss, C. H. (1998). *Evaluation methods for studying programs and policies* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Wengraf, T. (2001). *Qualitative research interviewing: Biographic narratives and semi-structured methods*. London: Sage.

Wechsler, D. (1958). *The measurement and appraisal of adult intelligence* (4th ed.). Baltimore, MD: Williams and Wilkins.

When, J. T. (1995). *The leader's companion: Insights on leadership through the ages*. New York, NY: The Free Press.

Wong, L., Bliese, P., & McGurk, D. (2003). Military leadership: A context specific review. *The Leadership Quarterly, 14*(6). 657- 692. doi: 10.1016/j.leaqua.2003.08.001.

Xirasagar, S., Samuels, M. E., & Curtin, T. F. (2006). Management training of physician executives, their leadership styles, and care management performance: An empirical study. *The American Journal of Managed Care, 12*(2), 101-108.

Yammarino. F. J., & Bass, B. M. (1990). Transformational leadership and multiple levels of analysis. *Human Relations, 43*(10), 974-995, doi: 10.1177/001872679004301003.

Yeakey, G. W. (2002). Situational leadership. *Military Review*. Retrieved from http://www.au.af.mil/au/awc/awcgate/milreview/yeakey.htm.

Yin, R. K. (2009). *Case study research: Design and methods* (4^{th} ed.). Thousand Oaks, CA: Sage Publishing.

Zakaria, Z. (2001). Factors related to information technology implementation in the Malaysian Ministry of Education Polytechnic. (Doctoral dissertation, Virginia Polytechnic Institute and State University, 2001).

Zayim, N. (2004). *Instructional technology adoption of medical school faculty in teaching and learning: Faculty characteristics and differentiating factors in adopter categories.* Unpublished doctoral dissertation, The Middle East Technical University, Ankara, Turkey.

Zayim, N., Yildirim, S., & Saka, O. (2006). Technology adoption of medical faculty in teaching: Differentiating factors in adopter categories. *Education Technology & Society*, *9*(2), 213-222.

Appendix A

Program Leaders Interview Protocol

Time of Interview Start: Interview End:

Date:

Place:

Introduction:

Interviewee:

1. What is your gender?
   - ○ Female
   - ○ Male

2. Age Range
   - ○ 21 – 34
   - ○ 35 – 54
   - ○ 55 – 65
   - ○ 65+

3. Education:
   - ○ Bachelors degree
   - ○ Master's
   - ○ Doctorate or professional
   - ○ Other:_______________

4. Leadership position:____

5. Rank:_________ Civilian:__________

6. How long have you been a faculty and/or academic staff member at the AMEDD, School of Health Sciences? Months ______ Years _______

Opening Statement and Discussion	**Researcher Comments & Reflection Notes**
7. Can you describe the progression of instructional technologies at the IPAP over the last two years? ***Probes: i.e. the adoption of real time or online learning; the adoption of digital videos.***	
8. Can you describe the current status of technology used for instruction at the IPAP by faculty members?	
9. Have you received any suggestions from faculty members regarding implementing technology? If so, were those suggestions put into practice for integrating technologies? ***Probes:*** • ***Could you tell me how that decision was made?*** • ***Do you often go to your faculty for suggestions?***	
10. In what ways does the administration *support* faculty members in their use of instructional technologies? ***Probes:*** • ***Do you provide training?*** • ***Do you provide materials?*** • ***Do you provide adequate hardware, software, or infrastructure?*** • ***Do you provide the encouragement to use instructional technologies?***	
11. Can you describe how faculty members are trained in the use of instructional technologies? ***Probes:*** • ***How much?*** • ***How often?*** • ***What kind?*** • ***Is there follow up training?*** • ***How useful is the training?***	

12. Do you have any documentation of the training in the form of handouts, training manuals, curriculum guides, or syllabus?	
13. Are there factors preventing faculty members from successfully adopting technology in their curriculum? What are they? How would you solve them?	
14. What did you do as a program leader to facilitate technology integration and adoption at the IPAP?	
15. Do you have additional comments related to faculty members instructional technology adoption issues here at the IPAP?	

Appendix B

Faculty Members Interview Protocol

Time of Interview Start: Interview End:

Date:

Place:

Introduction:

Interviewee:

1. What is your gender?
   - ○ Female
   - ○ Male

2. Age Range
   - ○ 21 – 34
   - ○ 35 – 54
   - ○ 55 – 64
   - ○ 65+

3. Education:
   - ○ Bachelors degree
   - ○ Master's
   - ○ Doctorate or professional
   - ○ Other:_______________

4. Rank:__________ Civilian:___________

5. How long have you been a faculty and/or academic staff member at the AMEDD, School of Health Sciences? Months ______ Years _______

Opening Statement and Discussion	Researcher Comments & Reflection Notes
6. Can you tell me how instructional technologies have changed over the last two years at the IPAP?	
7. How do you use instructional technology in your classroom?	
8. How do other members of the faculty use technology?	
9. What role do program leaders play in facilitating faculty member's integration of instructional technologies?	
10. How satisfied are you with the current level of involvement by program leaders in supporting faculty member's use of innovative technologies for teaching?	
11. Describe barriers you believe discourage you from adopting new innovative technology into your curriculum. ***Probes:*** • ***Not enough training*** • ***Lack of software, hardware, infrastructure*** • ***Insufficient support***	
12. Describe the instructional technology training you received here at the IPAP. ***Probes:*** • ***Amount of training*** • ***Quality of training*** • ***Usefulness of training***	
13. Can you give examples of the training? Do you have any documentation of the training in the form of handouts, training manuals, curriculum guides, or syllabus?	

14. How are you involved in decision making concerning the adoption and integration of instructional technology at the IPAP?	
15. What should the role of instructional technology be at the IPAP?	
16. What are the factors that affect your views on using technology as a tool for teaching and learning? If yes, what are these factors?	
17. Do you have any additional comments related to faculty member's technology integration issues?	

Appendix C

CLASSROOM OBSERVATION GUIDE

Military Training Program:____________________________________ Date:________________

Class #:________________________ Subject Area(s):_____________________________

Description of the program that provides the context for this training.

Duration: **Start Time**: _____________ **End Time**: ______________

Number of Students: __________ Number of Teachers: ___________

Technology Used by Faculty Members or Students (circle all that apply)

Laptops: FM S Desktop Computers: FM S PDAs: FM S

Calculators: FM S Cameras (Still or video): FM S TV/VCR: FM S

Other: ___________________________________

Setting:

○ Classroom ○ Physical Examination Lab ○ Lab ○ Library ○ Other

Pattern of Access to Technology (check only one):

- ○ Faculty/Staff access only
- ○ 2 students per device
- ○ One presentation station
- ○ 3-5 students per device
- ○ 1 student per device
- ○ More than 5 students per device

Average Length of Time Using Technology (check only one):

Time	5 min	10 min	20 min	30 min	45 min	60 min	90 min	120 min
Faculty								
Student								

Organization of the Classroom:

- ○ Traditional rows
- ○ Small clusters of 3-5 student desks
- ○ Lab
- ○ Desks in circles or semi-circles
- ○ Desks arrange so that students face each other
- ○ Other:

Classroom Layout:

Hardware & Software Technology Use	**Used by…**
Peripherals (hardware) (e.g. imaging, recording devices, digital & video cameras, scanners)	FM S
Educational management software (e.g. for attendance, grades, lesson plans)	FM S
Drill & practice	FM S
Word processing software	FM S
Data management (spreadsheets), graphing, or analysis software (e.g. *EXCELL, SPSS, JMP*)	FM S
Database software (e.g. *Filmmaker Pro, Microsoft Access*)	FM S
Presentation software (e.g. PowerPoint)	FM S
Email	FM S
Other communication tools (IM, *Blackboard, SKYPE,* video conferencing)	FM S
Desktop Publishing software	FM S
Web publishing software	FM S
Internet for research	FM S
Multimedia reference CDs for research (e.g. online encyclopedias)	FM S
Simulations/modeling software	FM S
Software for video, graphics, and sound editing or production	FM S
Other	FM S

Appendix D

DOCUMENT ANALYSIS FORM

Name of Document:____________________ ________________ Date Received:____________
Source of Document: ____________ Creator of Document: ___________ Date Prepared: _______

Overview of Document Contents

Document Facts & Issues

Potential Benefit of Document

Potential Bias of Document

Researcher Inferences from this Document

Additional Comments

APPENDIX E

IRB Approval

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24061
540/231-4991 Fax 540/231-0959
e-mail moored@vt.edu
www.irb.vt.edu
FWA00000572(expires 1/20/2010)
IRB # is IRB00000667

DATE: December 11, 2009

MEMORANDUM

TO: John Eller
Lorenzo Tarpley

Approval date: 12/11/2009
Continuing Review Due Date:11/26/2010
Expiration Date: 12/10/2010

FROM: David M. Moore

SUBJECT: **IRB Expedited Approval:** "Leadership and Adoption of Instructional Technology in a Military Medical Learning Environment: A Case Study" , IRB # 09-685

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective December 11, 2009.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.
3. Report promptly to the IRB of the study's closing (i.e., data collecting and data analysis complete at Virginia Tech). If the study is to continue past the expiration date (listed above), investigators must submit a request for continuing review prior to the continuing review due date (listed above). It is the researcher's responsibility to obtain re-approval from the IRB before the study's expiration date.
4. If re-approval is not obtained (unless the study has been reported to the IRB as closed) prior to the expiration date, all activities involving human subjects and data analysis must cease immediately, except where necessary to eliminate apparent immediate hazards to the subjects.

Important:
If you are conducting **federally funded non-exempt research**, please send the applicable OSP/grant proposal to the IRB office, once available. OSP funds may not be released until the IRB has compared and found consistent the proposal and related IRB applicaton.

cc: File

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE UNIVERSITY AND STATE UNIVERSITY

An equal opportunity, affirmative action institution

APPENDIX F

Permission Email from IPAP Program Director

Lorenzo Tarpley Jr

From: Tozier, William L COL MIL USA MEDCOM AMEDDCS [William.Tozier@AMEDD.ARMY.MIL]
Sent: Friday, June 12, 2009 5:08 PM
To: Lorenzo Tarpley Jr
Subject: RE: Research Study at the IPAP (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

Lorenzo,
You are more than welcome to examine any documents in the program. They are not restricted. When you send me your schedule, I will set up a schedule to make the best use of your limited time. You may have to bring your own computer and work off the network as it would take too long for you get authorization online. If you need electronic copies of documents, we can email them to you as military regulations no longer any attached hardware such as thumbdrives. If you need something printed, you can email the document to one of us who will print it out and then you can use the copier to make additional copies.
Good luck,

Bill

COL William Tozier, PA-C, MPH, PhD
Program Director, Interservice Physician Assistant Program

-----Original Message------
From: Lorenzo Tarpley Jr [mailto:tarpleyl@cox.net]
Sent: Friday, June 12, 2009 1:36 PM
To: Tozier, William L COL MIL USA MEDCOM AMEDDCS
Cc: tarpleyl@vt.edu
Subject: Research Study at the IPAP (UNCLASSIFIED)

Good afternoon Colonel Tozier,

As we discussed at the PA conference, I am sending you a request to use the Interservice Physician Assistant Program training site to conduct research for my dissertation. I will send you a formal letter explaining my research design and methodology which will include interviews, review of documents and artifacts, and observation of instructional technology use.
Also, after my prospectus which is scheduled for sometime between June and October 2009, I will send each participant a more formal detailed letter explaining the purpose of the study as well as the participants' role during the study.

I look forward to seeing you again in late August.

Thanks again,
and Take Care,

V/R

LCDR Lorenzo Tarpley Jr
MSC, USN, PA-C
Classification: UNCLASSIFIED
Caveats: FOUO

Appendix G

Invitation Letter to Potential Interviewees

Dear Colleague

This correspondence is to request your participation in an educational research study. I am currently collecting data for my dissertation that includes interviewing faculty from the Interservice Physician Assistant Program (IPAP). As an educator and clinician, I am interested in contributing to the theoretical knowledge in the medical educational field and recognize the importance of making use of faculty opinions regarding issues influencing the adoption and integration of instructional technology into the training of future physician assistant clinicians.

I am asking for your assistance and participation in this study by allowing me approximately 45 minutes to interview you. The objective of the interview is to identify, if any, factors facilitating or inhibiting the current use of instructional technologies for teaching and learning. The significance, recommendations, and the conclusion of the study will be based on your feedback.

Your participation in this research study is voluntary and confidential, and you may omit any question you do not wish to answer. Your choice of whether or not to participate will not affect your standing at the IPAP. Responses will be reported only in aggregate form. There are no known risks to participants and your responses will be handled in a confidential manner and released only as summaries with no personal or organizational identifiers.

Thank you very much for your extremely valuable contributions to this research. Your time spent, and prompt response is sincerely appreciated.

Sincerely,

LCDR Lorenzo Tarpley Jr
MSC, USN, PA-C
Virginia Tech, Ph.D Candidate in Education Leadership and Policy Studies

Email: tarpleyl@vt.edu

Appendix H

Virginia Polytechnic Institute and State University

Consent Form

Informed Consent for Faculty Members in Research Projects Involving Human Subjects

Title of Project: Leadership and Adoption of Instructional Technology in a Military Medical Learning Environment: A Case Study.

Principal Investigator: John F. Eller, PhD.

Co-Investigators: Lorenzo Tarpley Jr, LCDR, USN, PA-C

Research Advisor: Dr. John F. Eller

I. Purpose of this Research Project

The purpose of this study is to examine the adoption of instructional technology by faculty members at a military medical education program (Interservice Physician Assistant Program – IPAP) during the previous two years. Within the case study, factors that facilitated or inhibited the adoption of instructional technology will be examined. Additionally, leadership behaviors will be examined. This study will contribute to the theoretical knowledge by providing scholarly literature to prepare the next generation of clinical providers.

This study will be conducted at The Interservice Physician Assistant Program (IPAP) which is located at the Academy of Health Sciences (AHS), Army Medical Department Center and School (AMEDD C&S) on Fort Sam Houston, in San Antonio, Texas.

II. Procedures

This research will be gathered from a face-to-face interview protocol:

- The Faculty Members Interview Protocol, in which the investigator will interview you. This interview will be approximately 45 minutes long. At your agreement, the interview will be tape-recorded. If at any time of the interview you decide that you no longer want to be audio-recorded, you have the option to say so and the investigator will discontinue the recording. Your role in this interview will be to suggest the time and location of interview where you will answer a series of questions with the investigator in a location of convenience and privacy for you.

Virginia Tech Institutional Review Board: Project No. 09-685
Approved December 11, 2009 to December 10, 2010

III. Risks:

There are no more than minimal risks associated with research.

IV. Benefits:

The study will provide an opportunity for the participants to share their personal views, attitude, and opinions regarding instructional technology use in their program. This study will also contribute to the scholarly literature on instructional technology adoption and integration by faculty members in a medical training learning environment.

V. Extent of Anonymity and Confidentiality:

Your participation in this study will be completely confidential, and data collected from the survey instruments will be analyzed and presented in aggregate form only. Further, when publishing the results of this study, the names and identifiable information of the interviewees will be masked and removed from all documents. In addition, the following steps will be taken to protect your confidentiality:

- After research is complete, all names will be changed on transcripts and in any articles published about the work.
- During the study only the primary researcher and co-researcher will have access to documents with identifiable information.

VI. Compensation:

Participants will not be compensated for participating in this study.

VII. Freedom to Withdraw:

You are free at any time to withdraw from this project. There will be no penalty for withdrawing. To withdraw, you may contact LCDR Tarpley (Co-Investigator).

VIII. Subjects Responsibilities:

I voluntarily agree to participate in this study. I have the following responsibilities:

- Complete two survey questionnaires and submit it upon completion.

IX. Subjects Permission:

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledged and give my voluntary consent for participation in the project outlined in the aforementioned sections.
Your signature below indicates that you read the information and you agree to participate in this study.

____ ____________

Participant Signature Date

Should I have any pertinent questions about this research or its conduct, and research subjects' rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Lorenzo Tarpley Jr 540-273-0645 / tarpleyl@vt.edu

Co-Investigator Telephone/e-mail

Dr. John Eller 703-538-8485 / jeller@vt.edu

Principal Investigator/Faculty Advisor Telephone/e-mail

Dr. David M. Moore 540-231-4991 / moored@vt.edu

Chair, Virginia Tech Institutional Review Board (IRB) Telephone/e-mail

Virginia Tech Institutional Review Board: Project No. 09-685
Approved December 11, 2009 to December 10, 2010

Appendix I

Virginia Polytechnic Institute and State University

Consent Form

Informed Consent for Program Leaders in Research Projects Involving Human Subjects

Title of Project: Leadership and Adoption of Instructional Technology in a Military Medical Learning Environment: A Case Study.

Principal Investigator: John F. Eller, PhD.

Co-Investigators: Lorenzo Tarpley Jr, LCDR, USN, PA-C

Research Advisor: Dr. John F. Eller

I. Purpose of this Research Project

The purpose of this study is to examine the adoption of instructional technology by faculty members at a military medical education program (Interservice Physician Assistant Program – IPAP) during the previous two years. Within the case study, factors that facilitated or inhibited the adoption of instructional technology will be examined. Additionally, leadership behaviors will be examined. Results from the study will provide statistical data on the current status of technology adoption and integration plus identify internal and external factors that create barriers for faculty member's decision to adopt and integrate technology into their curriculum. This study will add data to the literature that relates to the degree to which leadership style, adaptability, and range of flexibility may contribute to medical faculty member's decision to integrating educational technology into their curriculum, thus preparing the next generation of clinical providers.

II. Procedures

This research will be gathered from a face-to-face interview protocol:

- The Program Leadership Interview Protocol, in which the co-investigator will interview you. This interview will be approximately 45 minutes long. At your agreement, the interview will be tape-recorded. If at any time of the interview you decide that you no longer want to be audio-recorded, you have the option to say so and the investigator will discontinue the recording. Your role in this interview will be to suggest the time and location of interview where you will answer a series of questions with the investigator in a location of convenience and privacy for you.

Virginia Tech Institutional Review Board: Project No. 09-685
Approved December 11, 2009 to December 10, 2010

III. Risks:

There are no more than minimal risks associated with research.

IV. Benefits:

Your interview along with the questionnaire will contribute to the scholarly literature on instructional technology adoption and integration by faculty members in a medical training learning environment. Also, the study may assist program leaders in recognizing how their leadership behaviors and styles may contribute to adoption and implementation pattern by their faculty members.

V. Extent of Anonymity and Confidentiality:

Names and identifiable information of the interviewees will be masked and removed from all documents. In addition, the following steps will be taken to protect your confidentiality:

- During the research, all reference to names will be substituted with a pseudonym on all transcripts and in any articles published about the work.
- During the study only the primary researcher and co-investigator will have access to documents with identifiable information.
- All audio recordings of interviews will be erased or destroyed after transcription.

VI. Compensation:

Participants will not be compensated for participating in this study.

VII. Freedom to Withdraw:

You are free at any time to withdraw from this project. There will be no penalty for withdrawing. To withdraw, you may contact LCDR Tarpley (Co-Investigator).

VIII. Subjects Responsibilities:

I voluntarily agree to participate in this study. I have the following responsibilities:

- Complete a survey questionnaire and submit it upon completion.
- To participate in an interview where I will be asked questions and have my words audio taped.

IX. Subjects Permission:

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledged and give my voluntary consent for participation in the project outlined in the aforementioned sections.

Your signature below indicates that you read the information and you agree to participate in this study.

____ ____________

Participant Signature Date

Should I have any pertinent questions about this research or its conduct, and research subjects' rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Lorenzo Tarpley Jr	540-273-0645 / tarpleyl@vt.edu
Co-Investigator	Telephone/e-mail
Dr. John Eller	703-538-8485 / jeller@vt.edu
Principal Investigator/ Faculty Advisor	Telephone/e-mail
Dr. David M. Moore	540-231-4991 / moored@vt.edu
Chair, Virginia Tech Institutional Review Board (IRB)	Telephone/e-mail

Virginia Tech Institutional Review Board: Project No. 09-685
Approved December 11, 2009 to December 10, 2010

Appendix J

Situation Leadership® Influence Behaviors Model

Used with permission per letter from Brandy Archambeault, Center for Leadership Studies, to Lorenzo Tarpley Sept. 12, 2009, attached.

CLS Center for Leadership Studies
Situational Leadership®
Unleashing Performance in the Real World

Getting Your Leadership to Perform...
Right Here, Right Now!

PERMISSION GRANTED

September 12, 2009

Reference: Permission Request 2009 09 09 A

Dear Lorenzo Tarpley,

I am writing on behalf of the Center for Leadership Studies (CLS).

At this time, permission to use our intellectual property, more specifically our LEAD Self and LEAD Other, in research associated with your dissertation has been approved. To recap, you have agreed not to reproduce (put a copy of) our copyrighted material in the body of your dissertation but have been granted permission for the set up fee of $49.95 USD + $2.95 per respondent (up to 50 respondents) to use our online scoring site for delivery and management of LEAD assessments. You may also use the results of your research based on our intellectual property in your dissertation and have the right to publish those results based upon the use of said instrument. Permission is granted for this current project only and survey access shall not extend beyond December of 2009. Our material may not be used in derivative works. **Permission has been granted for printed text, *non-exclusive* distributions only. None of our copyrighted material may be made available electronically unless otherwise indicated herein.**

Additionally, permission to reproduce our copyrighted figure in your dissertation in the manner consistent with Addendum A has been approved. To recap, you have agreed to use the 2006 copyrighted version of the model (Addendum A) with the credit line: "© Copyright 2006 Reprinted with permission of the Center for Leadership Studies, Inc. Escondido, CA 92025. All rights reserved." Permission is granted for this current project only. Our material may not be used in derivative works. **Permission has been granted for printed text, *non-exclusive* distributions only. None of our copyrighted material may be made available electronically unless otherwise indicated herein.**

You agree to mail a complete copy of the dissertation to CLS as submitted to your accredited college. Use of our copyrighted material in your body of work will be construed as agreement to allow CLS to make any use of said documents as submitted to us available for any such use as the organization wishes to make of them to include but not limited to promotional and marketing materials. You also grant CLS the right to make those documents available for use by other academics, either in their original form or as modified by the Company. Furthermore, other individuals who use such material have the right to modify or adapt the material themselves in print media only with proper reference to the author (you) who created it.

All references to Situational Leadership® or Performance Readiness ® therein must be capitalized and have the ® follow whenever it appears.

We are pleased to grant permission and wish you much success.

I hereby represent and warrant that I have the right to grant permission to use the material specified above without violation of third party rights.

Brandy Archambeault
Copyright and Permissions Officer

www.situational.com

Center for Leadership Studies ▪ 230 West 3rd Avenue ▪ Escondido, CA 92025 ▪ Phone: (800) 330-2840 ▪ International +1 (760) 741-6595

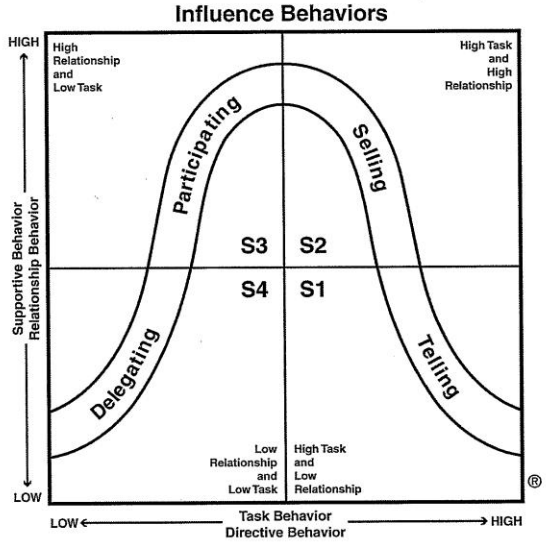
Copyright ©2009 Center for Leadership Studies
Situational Leadership®, Situational Coaching®, Situational Selling®, Situational Parenting®, and Performance Readiness® are all registered trademarks of Leadership Studies, Inc.
Situational Service® is a registered trademark of Situational Services, Inc.

CLS Center for Leadership Studies
Situational Leadership®
Unleashing Performance in the Real World

Getting Your Leadership to Perform...
Right Here, Right Now!

Addendum A

Situational Leadership®
Influence Behaviors



Performance Readiness®

HIGH	MODERATE		LOW
R4	R3	R2	R1
Able and Confident and Willing	Able but Insecure or Unwilling	Unable but Confident or Willing	Unable and Insecure or Unwilling

© Copyright 2006 Reprinted with permission of the Center for Leadership Studies, Inc., Escondido, CA 92025. All rights reserved.

www.situational.com

Center for Leadership Studies ▪ 230 West 3rd Avenue ▪ Escondido, CA 92025 ▪ Phone: (800) 330-2840 ▪ International +1 (760) 741-6595

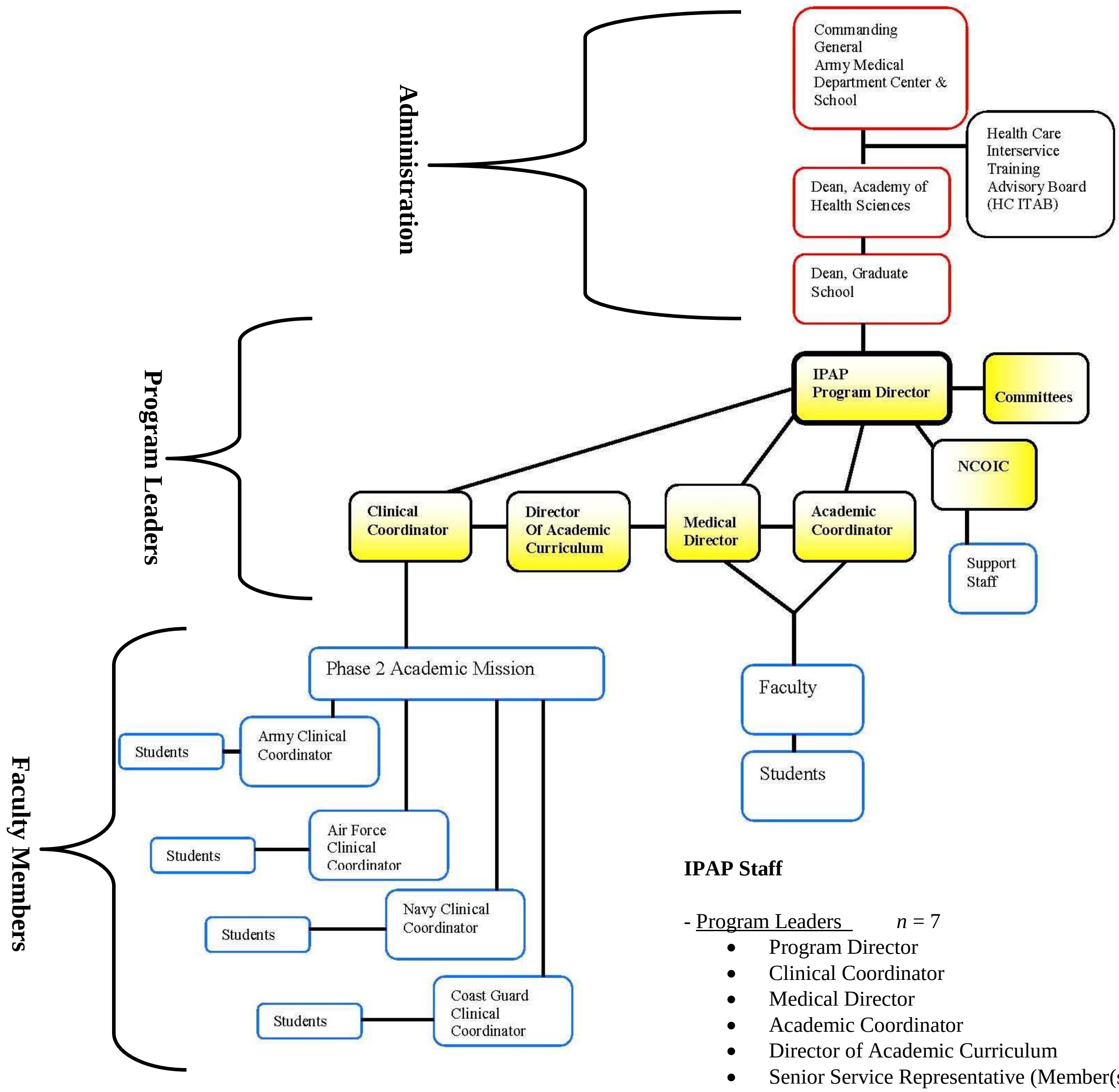
Copyright ©2009 Center for Leadership Studies
Situational Leadership®, Situational Coaching®, Situational Selling®, Situational Parenting®, and Performance Readiness® are all registered trademarks of Leadership Studies, Inc.
Situational Service® is a registered trademark of Situational Services, Inc.

Appendix K

Maximum Variation Sampling Matrix for Selection of Sample from Population of the Interservice Physician Assistant Program (IPAP)

P = Participant **FM = Faculty Member** **PL = Program Leader**	**Age** 25-34 35-44 45-54 55-64	**Branch of Service** Air Force Army Coast Guard Navy	**Rank** O3 - O4 O5 - O6 GS10 - GS12 GS-13 - GS15 E6 - E9	**Degree** BA/BS Master's Doctorate or Professional Other	**Years at IPAP** < 2 > 2
P1 (FM)	**25-34**	**USA**	**O3 - O4**	**O**	**< 2**
P2 (FM)	**45-54**	**USA**	**O3 – O4**	**M**	**< 2**
P3 (FM)	**45-54**	**USA**	**O3 - O4**	**M**	**< 2**
P4 (FM)	**35-44**	**USN**	**O3 - O4**	**M**	**> 2**
P5 (PL)	**45-54**	**USA**	**O5 - O6**	**M**	**> 2**
P6 (FM)	**35-44**	**USA**	**O3 - O4**	**M**	**> 2**
P7 (PL)	**55-64**	**USA**	**O5 - O6**	**D**	**> 2**
P8 (FM)	**35-44**	**USCG**	**O3 - O4**	**M**	**> 2**
P9 (PL)	**45-54**	**CIV**	**GS13-GS15**	**M**	**> 2**
P10 (FM)	**45-54**	**USA**	**O3 - O4**	**M**	**< 2**
P11 (FM)	**45-54**	**CIV**	**GS10-GS12**	**M**	**> 2**
P12 (FM)	**35-44**	**USA**	**E6 – E9**	**O**	**< 2**
P13 (FM)	**35-44**	**USAF**	**O3 - O4**	**M**	**< 2**
P14 (FM)	**35-44**	**USN**	**O3 – O4**	**M**	**> 2**
P 15 (FM)	**45-54**	**CIV**	**GS10-GS12**	**M**	**> 2**
15 Total Participants	**45-54 = 7** **35-44 = 6** **55-64 = 1** **25-34 = 1**	**USA = 8** **CIV = 3** **USN = 2** **USAF = 1** **USCG =1**	**O3-O4 = 9** **O5-O6 = 2** **GS10-GS12 = 2** **GS-13 =1** **E6-E9 = 1**	**M = 12** **D = 1** **O = 2**	**> 2 = 9** **< 2 = 6**

Appendix L

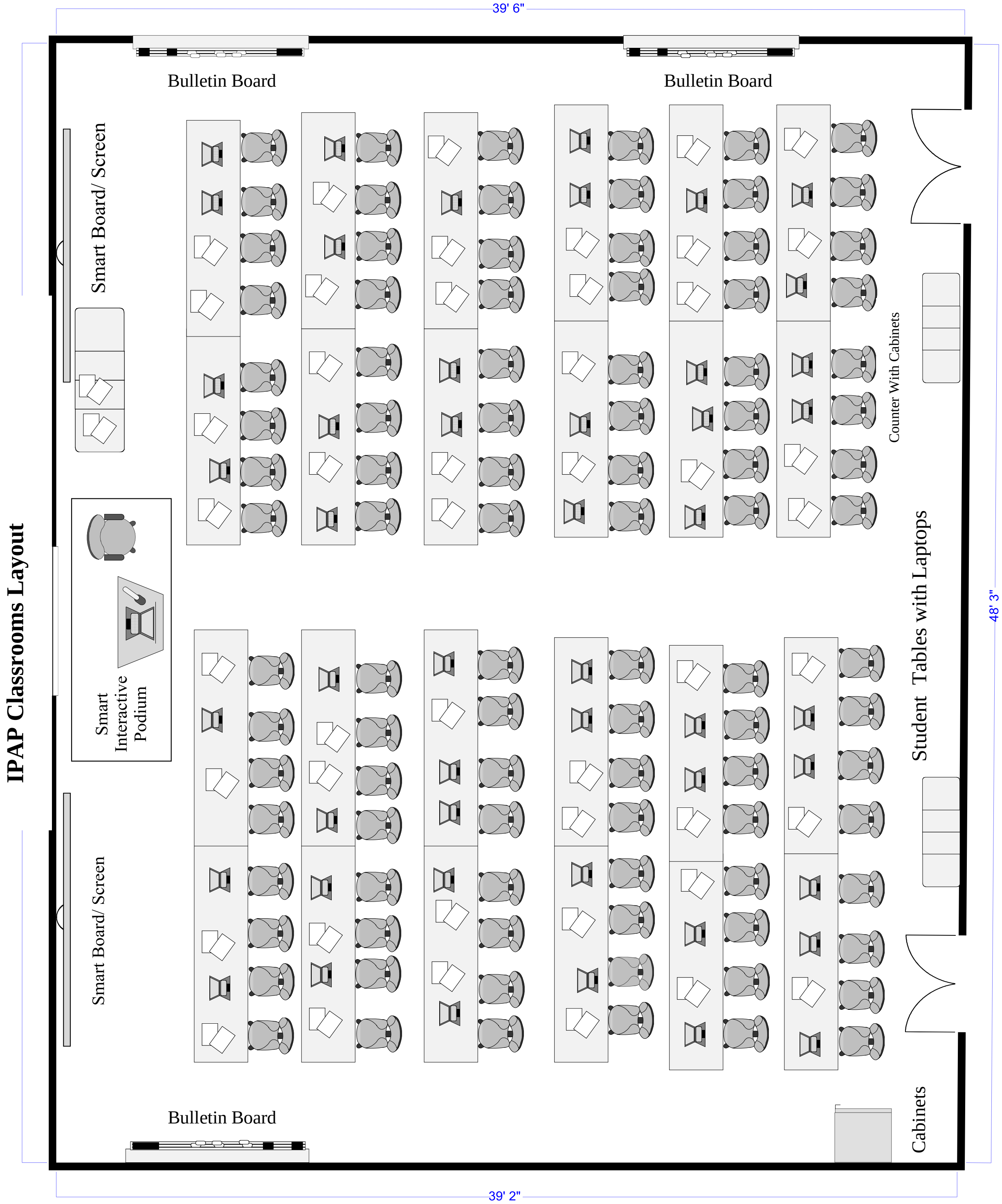


IPAP Staff

- Program Leaders $n = 7$
  - Program Director
  - Clinical Coordinator
  - Medical Director
  - Academic Coordinator
  - Director of Academic Curriculum
  - Senior Service Representative (Member(s) of the Executive plus Committee)
  - NCOIC (Non-Commissioned Officer in Charge
- Faculty Members $n = 20$

Figure 4. Interservice Physician Assistant Program (IPAP) Organizational Chart

Appendix M



Appendix N

Smart Boards and Smart Podium being used in IPAP Classrooms

Harvey Mannequin

SimMan Mannequins used in
Combat Medic Trauma Training

Army Medical Department Center & School (AMEDD)
Home of the
Interservice Physician Assistant Program (IPAP)

Appendix O

IPAP Physical Examination Training Rooms Layout