# A descriptive study of the process post-secondary military institutions use to adopt, implement and train for use of new instructional technologies.

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## ABSTRACT

The purpose of this descriptive case study was to identify the strategies used by post-secondary military institutions to adopt, implement and train faculty for the use of new instructional technologies in the learning environment. Termed the Innovation Migration Process, it includes: 1) the adoption decision (selection of the innovation), 2) strategies for implementation and, 3) how faculty are trained on its use.

The study was a two phased, explanatory, mixed-methods design beginning with a quantitative survey, followed by twelve qualitative interviews conducted at two exemplary institutions.

The study identified two strategies are used to adopt new technology: 1) authoritative decisions from the "top-down" and 2) a bottom-up strategy where new technology is first used by innovators who work with a central organization to adopt the change. Five strategies were identified to implement the innovation: 1) centralized training; 2) leadership commitment; 3) tapping expertise; 4) well defined support for pedagogy and technical issues; and 5) a robust infrastructure. Four strategies were found for training faculty: 1) tapping expertise (indicating training and implementation are interwoven); 2) formal training; and 4) dedicated training time. The fourth strategy, incentives and rewards, was used successfully by one of the two exemplary institutions, but few of the other institutions offered either of these for training.

Suggested guidelines for post-secondary, military institutions include: create a culture of innovativeness; demonstrated commitment by the leadership; follow Ely's Eight Conditions for Implementation; develop a centralized training organization; develop a robust technical support organization; invest in the infrastructure; seek out and support innovators; use a formal faculty development program.

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# A descriptive study of the process post-secondary military institutions use to adopt, implement and train for use of new instructional technologies

## Organization of the Study

This study is comprised of five chapters and each chapter begins with an introduction and format description. The first chapter introduces the problem, describes the need for the study, presents the research questions and provides a rationale for the significance of the study.

Chapter 2 is a review of the major literature that addresses the research questions. This chapter specifically reviews the literature on the subjects of: 1) adoption of technology; 2) implementation of new innovations; and 3) faculty development related to the acceptance and use of a new technology in the learning environment.

Chapter 3 details the research method used to conduct the study. This includes specifying the rationale for selecting the research design, selecting the study population, a description of the data collection and the method used to analyze the data.

Chapter 4 presents the study's findings derived from the survey data, the interview data and how they supported by the literature. The research questions are answered in this chapter.

Chapter 5 is a summary of the study and provides suggested guidelines for consideration based on the study's findings. These suggested guidelines may be useful to institutions that are migrating to new instructional technology.

# Chapter 1 - Introduction and Need for the Study

## *Introduction to the chapter*

This chapter describes the issues post-secondary military institutions face when struggling with the need to identify and migrate to new instructional technology. In this chapter, the researcher argues why technology adoption, implementation and training are significant problems and what this study proposes to accomplish. Three specific research questions are presented and a case is made for why this study has value to military institutions, administrators and faculty.

## *Statement of the Problem*

The role technology plays in teaching and learning has constantly changed, from the time images were projected by kerosene lantern in the 1800s through the complex, digital age in which we all live. Today's technology is pervasive, it's "cool," has a built-in "wow" factor and its use has become critical to our way of life (Ely, 1995; MacKenzie & Wajcman, 1999; Roberts, 2008; N. Smith, 2002; Vrasidas & McIsaac, 2001). Too often, however, the prevailing philosophy is, if it is new, it must be better, ignoring the fact that technology is not "one size fits all" (Ely, 1995; Geoghegan, 1994; Mann, 1999). The methods and strategies used for adoption and implementation also demand attention since a perfect solution poorly implemented is less than effective (Klein & Sorra, 1996; McQuiggan, 2006). Once a new technology is selected and implemented, institutions must also address how the faculty are trained, and this appears to be

a major issue. Colleges invest millions of dollars in classroom technology to assist in teaching, but relatively little in training on how to use it effectively (Bennett & Bennett, 2003; Mehra & Mital, 2007; Spector, 2006; Young, 2004). Thus, a significant problem faced by educational institutions is deciding which technology to select, how to implement it in their curricula and how best to ensure their faculty are trained on its effective use.

The dimensions of this problem are greatly increased by the choices of technology available today. We find ourselves in an era of accelerating technological change, where capabilities not thought possible a handful of years ago are becoming the norm in today's society. Twitter, podcasts, social networking, video gaming, simulations, 2nd Life, advances in artificial intelligence, virtual reality, blogs, ePortfolios, iPhones/PDAs, instant messaging and wireless networks are just a few of the technologies that add a degree of instability in the field of instructional design and technology. We are experiencing these technological advances at a rate that outstrips our ability to understand how best to use them (Duderstadt, 1999; Jacobs & Dempsey, 2007; Norman, 1993; Zemsky & Massy, 2004a), and in fact, these technologies may lead to less effective teaching since for the most part, faculty members use the electronics to simplify tasks, not to fundamentally change how they teach their subjects (Ely, 1995; Todtling & Trippl, 2005; Zemsky & Massy, 2004b). These technologies can be ignored only at the cost of losing the classroom interest of students who readily adopt them in their daily lives.

These technologies are not in and of themselves good or bad (Ely, 1995; Farmer, 2006; Norman, 1993), but how the technology is used and the practitioner's level of training and expertise determines to a large degree the quality and impact on the learner (Ferdig, 2006). This highlights the problem of how to avoid being seduced into incorporating these innovations (i.e., if it is new it must be better) without fully understanding them. As these new technologies become available for classroom use, institutions will have to show some restraint in adopting them. We cannot blindly replace the current technology because the integration of new technology demands changes in instructional design as well as developing new skills for their use (Alanis, 2004; Ringstaff & Kelley, 2002). It is critical for institutions to identify and understand which of these new technologies will have the greatest impact on their student's learning. This will necessitate the ability to successfully "merge sound, time-tested pedagogy with innovative tools in order to take fullest advantage of the possibilities offered by learning technologies" (Surry, 2008b, p. 416). Programs such as the US Department of Education's *Preparing Tomorrow's Teachers to Use Technology Today* point to the fact that integrating technology into classroom instruction comes with a high price (Bell, 2001; Russell, Bebell, O'Dwyer, & O'Connor, 2003). Further, it is very difficult to fairly and accurately assess the impact of instructional technology (Ringstaff & Kelley, 2002). How then can institutions determine if it is worthwhile to adopt these new technologies into their curricula?

No one knows what the future holds for technological advances. History tells us that many emerging technologies will have a great impact on teaching

and learning. History also tells us that we cannot randomly select technologies for classroom use and expect them to magically improve teaching and learning (Albright & Graf, 1992, p. 5; Ferdig, 2006; Lofstrom & Nevgi, 2007). So we must ask ourselves, which of these make sense to use for education and how can we implement and train for their use?

Researching the strategies institutions use to adopt, implement and train their faculty on new instructional technologies should prove useful to decision makers. Data-based and guidelines from such a study could help those responsible for migrating to new technology prepare for the rapid technology changes the future will bring (Gilbert, 2000; Ringstaff & Kelley, 2002; Surry, 2008a, p. 392; Zemsky & Massy, 2004b). An equally important benefit of analyzing successful strategies for adopting, implementing and training for new instructional technology is the possibility to reduce institutional costs and faculty frustration.

## *Purpose of the Study*

The purpose of this study is to address these three issues (adoption, implementation, and faculty training for new technologies) by analyzing military institutions of higher education. Using data from this study, it will be possible to suggest a set guidelines that may increase the likelihood of successfully migrating to new instructional technology. The findings from this study will also be useful to administrators as they struggle with purchasing decisions and shrinking budgets (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004; Zemsky & Massy, 2004a). Additionally, this study will serve as a reference for

faculty and curricula developers who attempt to integrate technology into the classroom, an effort considered to be a major professional development challenge for faculty developers and academic institutions (Sherer, Shea, & Kristensen, 2003; Young, 2004).

The study will identify: 1) the strategies used to decide which new technologies to adopt; 2) how these new technologies are implemented across the institution; and 3) the means by which the faculty are trained on the new technology. The study will use survey data to select an exemplary program that will be examined, along with the prior research to develop a set of suggested guidelines for using instructional technology in post-secondary military institutions.

## *Research Questions*

The following research questions served as the focus of this study:

### *Research question 1:*

What are the strategies used by post-secondary military institutions to adopt (select) new instructional technologies?

### *Research question 2:*

What strategies are used to implement the adopted technologies within their institutions?

### *Research question 3:*

How are faculty trained to make use of the adopted instructional technology?

## *Limitations*

1. The study used a purposeful sample consisting of federal service academies, senior military colleges and junior military colleges. These institutions have unique attributes and may not be entirely representative of all post-secondary institutions. Thus, the ability to accurately generalize the findings to all institutions of higher education may be limited.
2. One method of data collection, using surveys, has some inherent limitations. The length of the survey was kept to a minimum number of questions to encourage a high rate of response. This means that relevant data may have been missed. However, this limitation is mitigated through the use of follow-up, on-site interviews.

## *Definitions*

**Adoption:** the decision to make full use of an innovation as the best course of action available by an individual or organization, i.e., selecting a new technology to use (Rogers, 2003, p. 21). The term adoption is used interchangeably with "selection".

**Diffusion:** "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 5).

**Faculty training/development:** those actions taken by an institution to increase the knowledge, skills and inclination to use instructional technology. This term is not used in the broad sense normally

associated with faculty development, i.e., teaching how to teach. In this context, it means training faculty to efficiently use the new technology.

**Implementation:** the process of fostering the use of a specific innovation within an organization after the initial decision to adopt.

**Innovation:** the "idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12).

**Innovation Migration Process:** the "cradle-to-grave" process of: 1) the factors that prompt an institution to seek an innovation or new process, 2) adoption of the innovation, including technology selection, 3) implementing the technology throughout the organization and 4) training the practitioners.

**Learning Environment:** includes both a traditional classroom and distance education.

**New Technology:** a technology that is new to the institution or organization. This can be an emerging technology or a mature technology that has not been previously used by the institution.

# Chapter 2 - Review of Literature

## *Introduction to the chapter*

This chapter examines the literature as it pertains to the Innovation Migration Process. This term serves as an overarching framework for the study and is used to describe the "cradle-to-grave" process of: 1) the factors that prompt an institution to seek an innovation or new process, 2) adoption of the innovation, including technology selection, 3) implementing the technology throughout the organization and 4) training the practitioners.

The chapter addresses each of these stages and provides a summary at the end of the chapter. This format follows a logical sequence of the Innovation Migration Process and mirrors the research questions.

## *Introduction to literature review*

Inherent in the field of Instructional Design and Technology (IDT) is the integration of innovation, i.e., adopting new technologies to enable an organization to better perform (Reiser & Dempsey, 2007, p. 104). The hurdles that must be overcome to successfully migrate to a new technology are not trivial and examples of failed programs are numerous. These failures litter every field of endeavor, from business and industry, to government, to the military and the healthcare profession. Furthermore, many researchers studying this problem conclude that higher education is not immune to the low percentage of successful migrations, and point out that even those that are successful tend to have a low rate of acceptance by faculty and curriculum developers (Albright &

Graf, 1992, p. 2; Bauer & Kenton, 2005; Gentry & Csete, 1991; Gulbahar, 2007; Mehra & Mital, 2007; Nichols, 2008; Reigeluth, 1989, 2001). Other studies conclude that post secondary institutions have not kept pace with the rapid advance of technology (Borgman, et al., 2008; Kerrey & Isakson, 2000; Murray, 2008; Reiser & Dempsey, 2007, p. 105; Sherry, Billig, Tavalin, & Gibson, 2000) which suggests many higher education organizations have not attempted this process and the percentage of failures may therefore actually be higher.

Some studies sought to understand why the failure rate is so high and found that many attempts were generated by political decisions mandating that innovation be integrated into the public school system (Barron, Kemker, Harmes, & Kalaydjian, 2003; Congress, 2001; Culp, Honey, & Mandinach, 2005). This could lead to half-hearted measures and/or a lack of understanding on how best to make this change happen. In their chapter on *Adoption, Diffusion, Implementation, and Institutionalization of Instructional Innovations*, Surry and Ely describe a primary reason for the failure to successfully migrate to new technology as the reliance on "developing instructionally sound and technologically superior products while giving less consideration to the context of their use." They go on to say that "to fully understand the field of educational technology, practitioners have to understand more than just hardware, software, design models and learning theory" and suggest it is important to understand why people do and do not use technology (Surry & Ely, 2007, p. 105).

The rapid advance of technology combined with the desire to remain current with new technology, and the political mandates for classroom innovation

suggest that the rate of change brought about by innovation may increase. It is becoming more and more important to understand the Innovation Migration Process, and this begins with an understanding of General Diffusion Theory.

## *General Diffusion Theory*

Numerous studies on adoption and diffusion have been undertaken; however, it is a fairly new area of research (Surry & Farquhar, 1997). Early researchers focused their work on agriculture and were interested in learning the social aspects of how farmers migrated from traditional seed corn to an improved hybrid seed. The 1943 study conducted by Ryan and Gross is thought by many to be the first and most influential study on the Innovation Migration Process (Rogers, 2003, p. 31). Subsequent researchers used the Ryan and Gross model when applying it to other disciplines, making this study the primary research method to study the Innovation Migration Process (Fliegel & Kivlin, 1962; Rogers, 2003, p. 35, 55; Ryan, 1948).

Perhaps the most influential researcher in this area is Everett M. Rogers whose seminal work offers theories on adoption and diffusion. In his book *Diffusion of Innovations,* first published in 1962 and now in its 5th edition, Everett Rogers conceptualized the field of diffusion study and established the theoretical work upon which others have based their research. The field is still evolving, and while a unified and comprehensive theory that explains why people and institutions migrate to a new technology has not been accepted (Fichman, 2000; Surry & Brennan, 1998; Surry & Farquhar, 1997), Rogers' book is considered the

landmark work on the subject (Fichman, 2000; Surry & Ely, 2007). An internet search on this book produces almost twenty-five thousand citations of the work.

The following section addresses the General Diffusion Theory based on Rogers' work, beginning with the elements of diffusion of innovations and followed by Rogers' four most widely used theories (Rogers, 2003). Different viewpoints will be included where they are relevant to this study.

## *Elements of Diffusion*

While other researchers have differing views of the definition of diffusion, Rogers' defines it as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 5), with the result that an individual or organization will adopt or reject the innovation. In his early work, Rogers discovered four key elements that are always present in any migration to a new technology. These are: 1) innovation, 2) communication, 3) time, and 4) social system (Rogers, 2003, p. 11).

### Innovation - First key element of diffusion:

Rogers defines innovation as, "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12). There are two concepts that must be understood about innovation. First, the perception of being new may only be in the mind of the potential adopter, since it is possible the innovation has existed for some time (van de Ven, 1986). Second, there is some disagreement as to whether an innovation is always good.

One argument is that innovation involves change but changes can be made without involving innovation, meaning that innovation is equated with progress (Davis, 1979; Greg, 2003; Ingram, 1994; Levin & Wadmany, 2008). Others disagree suggesting that an innovation does not automatically mean the new idea is better or will benefit the potential adopter (van Dam, 2005; Judson, 2006; Straub, 2009).

## Communication – Second key element of diffusion:

Rogers makes a distinction between communication and the means by which it is conveyed, which he terms the "communication channel." He defines communication as "the process by which participants create and share information with one another in order to reach a mutual understanding." He defines the communications channel as "the means by which messages get from one individual to another" (Rogers, 2003, p. 18). Communication among and between humans is the critical component of innovation diffusion and falls into two categories: interpersonal channels and mass media channels. The difference between the two is the manner in which the information is transmitted. One-on-one communication between two people, one with knowledge of an innovation and one without, is called interpersonal communication. The mass media channel describes the use of a one-to-many relationship where an individual or small group of individuals transmit knowledge of an innovation to large groups. The means to do this are what we typically think of as mass media, and examples are radio, TV, social networking sites and other internet applications such as webcasts and podcasts. Most studies show that the

interpersonal channel, including email, social networking sites and blogs are the most effective means of influencing individuals to adopt a new technology (Bass, 2004; Rogers, 2003, p.338; C. E. Watson, 2007).

In their early study, Ryan & Gross found that the relationship between individuals is also a factor in how likely one is to adopt a new technology. Individuals of similar circumstances such as friends, social equals and those who share similar interests are more likely to adopt an innovation based on the recommendation of their peers. In fact, they found that, "there is no doubt but that the behavior of one individual in an interacting population affects the behavior of his fellows" (Ryan, 1948; Ryan & Gross, 1943). Rogers calls this homophily and defines it as "the degree to which two or more individuals who interact are similar in certain attributes, such as beliefs, education, socioeconomic status, and the like" (Rogers, 2003, p. 19).

Conversely, individuals who do not share common attributes are termed heterophilous, which describes groups who do not share the trust and social bonds that more homophilous groups enjoy. Rogers points out that too much of either homophily or heterophily can become a barrier to diffusion. The ideal situation according to Rogers is a homophilous group seeking an innovation and a heterophilous group providing the information about the innovation (Rogers, 2003, p. 19).

### Time – Third key element of diffusion:

Rogers has time as his third element of diffusion and he characterizes it through three components. The first is the innovation-decision process that

takes an individual from becoming aware of an innovation to either accepting or rejecting it. This component reinforces the idea that adoption of an innovation does not occur in a short period of time, but happens over time (Surry & Ely, 2007). The second component is the rate of adoption, which describes how quickly an innovation is accepted by a large number of people. The third component is innovativeness, which Rogers uses to describe the stage at which an individual or organization adopts an innovation compared to a peer group or organization. Time is a key component in how innovation is measured, i.e., how quickly an individual or organization accepts the new technology (Rogers, 2003, p. 20). These components are critical to the Innovation Migration Process and are explored more fully later in the literature review.

## Social System – Fourth key element of diffusion:

Rogers believes the social setting of a group of individuals or organization is important in the diffusion process. He defines social system as "a set of interrelated units that are engaged in joint problem solving to accomplish a common goal" (Rogers, 2003, p. 23). The common goals of the group or organization drive the dissemination of the knowledge, but the decision to adopt is made in one of three ways: 1) optional innovation decisions are made by individuals without the benefit or cohesion of others in the group. 2) collective innovation decisions are made by a majority of the group. However, in some social systems, an informal leader evolves and can influence a decision to adopt or reject an innovation. 3) authority innovation decisions are "top-down" driven, coming from an individual having positional authority relieving an individual of the

choice to adopt or reject and tending to result in a somewhat faster rate of adoption (Rogers, 2003, p. 29).

## Innovation Decision Process

In his book, *Diffusion of Innovations,* Rogers presents four major theories of diffusion. These represent the four most commonly used theories in diffusion studies and are discussed below. The first of these is the Innovation Decision Process in which Rogers suggests that diffusion is not a single act, but a process that occurs over time and that potential adopters will transition through five distinct stages before the innovation is completely adopted. These stages are knowledge, persuasion, decision, implementation and confirmation (Rogers, 2003, p. 169).

## Stages of the Innovation-Decision Process

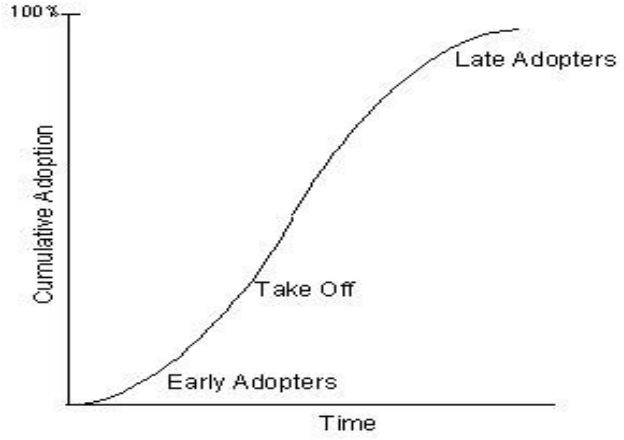
Knowledge is the first stage and describes the point at which a potential adopter becomes aware of a new technology. Included in this stage is the need to understand the basics of the innovation and how it works. This stage is characterized by either passive individuals who are influenced by others and will identify a potential solution through them (Dholakia & Kshetri, 2004; Fourt & Woodlock, 1960) or by individuals or organizations that actively look for innovations to solve a specific requirement (Rogers, 2003, p. 171). In other words, “does a need precede awareness-knowledge of a new idea, or does such knowledge of an innovation create a need for the new idea?” (Rogers, 2003, p. 172).

Persuasion is the second stage and is the point where the potential adopter forms an opinion about the innovation. This opinion can be positive or negative and will directly affect the next stage, the Decision stage. At this stage, the potential adopter will decide whether or not to proceed with plans to migrate to the new technology. Implementation is the fourth stage and is where the technology is disseminated across the organization.

The last stage is that of Confirmation and is where the potential adopter either accepts or rejects the new technology. This stage is usually evidenced by the continued use of the innovation, however the individual or organization may decide to reverse the decision to adopt if it does not live up to expectations (Rogers, 2003, p. 169).

Chart 2.1

**Diffusion Process**




Source: Rogers (1995)

## Rate of Adoption

Rate of adoption is the term used by Rogers to describe how quickly an innovation is adopted by a social system. The rate of adoption is measured over a period of time and can be graphed to show the number of adopters across time. The graph will normally conform to an S-curve and is “a numerical indicator of the steepness of the adoption curve for an innovation” (Rogers, 2003, p.221). This is due to the slow initial rate of adoption normally seen, followed by an acceleration period where the graph will show a

steep climb. The rate of adoption will level off as the innovation becomes saturated in the social system, and at the point where the usefulness of the innovation is lessened, the graph will show a decline. Chart 2.1 titled Diffusion Process is an example of a typical cumulative curve (Rogers, 2003, p. 272).

## *Theory of Perceived Attributes*

Rogers explains that every innovation has certain characteristics that influence an individual or organization to either adopt or reject it. He calls this the Theory of Perceived Attributes, and explains that these qualities "are the most important characteristics of innovations in explaining the rate of adoption" (Rogers, 2003, p.15).

While other studies suggest there are a large number of attributes associated with rate of adoption (Kearns, 1992), Rogers work describes five that are most influential. These are: 1) relative advantage, 2) compatibility, 3) trialability, 4) observability, and 5) complexity. The first four factors are generally positively correlated with the rate of adoption while the fifth, complexity, is not (Rogers, 2003, p. 15).

### Relative advantage

Relative advantage describes the degree to which an individual or organization perceives an innovation to be better than the technology or idea it is replacing (Rogers, 2003, p. 229). There are numerous factors that change the dynamic of relative advantage. The type of the innovation can change the perceived relative advantage as can the characteristics of the potential adopter.

For example, low cost might make the innovation more attractive for an individual or organization to adopt.

### Compatibility

Several studies indicate that the closer an innovation aligns with an individual or organization's values, culture and perceived needs, the more likely it is to be adopted (Greenhalgh, et al., 2004; Rogers, 2003, p. 240). Rogers explains this through his definition of compatibility, which is "the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of the potential adopter" (Rogers, 2003, p. 240). It stands to reason that the more comfortable an individual or organization is with an innovation, the more likely they are to use it.

### Trialability

Trialability describes how easily an innovation can be used on a trial basis (Rogers, 2003, p. 258). Trialability supports compatibility in that using an innovation on a limited basis reduces the uncertainty and allows an individual to build confidence in its capabilities (Rogers & Scott, 1997). This factor is particularly important when an innovation has no precedence to follow and therefore early adopters will themselves become the precedence (Rogers, 2003, p. 258).

### Observability

Rogers uses this term to describe "the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 258). This is an important

factor for potential adopters and falls under the category of “seeing is believing.” The degree to which an innovation can be observed by others is positively correlated with the likelihood it will be adopted (Rogers, 2003, p. 258).

### Complexity

Complexity describes how difficult an innovation is to learn to use. It is the only one of the five factors that is not positively correlated with the rate of adoption, i.e. there is an inverse correlation between complexity and an innovation’s rate of adoption. This makes sense when one considers that the more difficult it is to learn and use a new technology, the less likely it is to be adopted, while innovations seen as simple to use are more readily adopted (Greenhalgh, et al., 2004; Tornatzky & Klein, 1982).

Rogers suggests some strategies that can help reduce the complexity of an innovation and therefore increase the likelihood of adoption. These include: 1) adopting the innovation in stages, thereby making it more manageable, 2) offering demonstrations to show its’ successful use, and 3) aligning its attributes and operation with those of earlier technologies (Rogers, 2003, pp. 257, 263, 412).

## *Individual Innovativeness Theory*

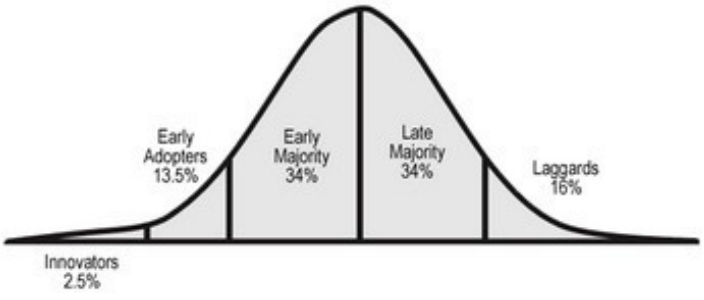
A second important theory that came out of Rogers’ work is that of individual innovativeness. The basis for this theory is that “individuals in a social system do not all adopt an innovation at the same time” (Rogers, 2003, p. 267). People who are by nature more innovative will adopt an innovation earlier than

those who are not, and individuals fall into defined categories based on when they begin to use an innovation (Rogers, 2003, pp. 22, 267). This concept suggests a continuum, beginning with those who adopt an innovation early, and ending with those who adopt an innovation either very late in the cycle, or possibly not at all. Rogers categorized this continuum into five groups and believes this concept – innovativeness – is indicative of behavioral change, not simply a change in thought. It "is the bottom line behavior in the diffusion process," suggesting it is the main dependent variable for diffusion studies (Rogers, 2003, p. 268).

The five categories of this theory are: innovators, early adopters, early majority, late majority and laggards. Using statistical analysis, Rogers found these five categories typically follow a standard bell shaped curve, and using standard deviation and mean, he assigned percentages to each category. It should be noted that using an odd number of categories does not provide for a symmetrical graph, and this is depicted in the chart 2.2 above. Rogers believes it is important to make a distinction between individuals who are willing and eager to try something new and those who exercise a varying degree of caution. Other researchers note this difference and assign different categories to it (Bass, 1969;

Chart 2.2

Categories of Innovativeness*




*From E.M. Rogers, *Diffusion of Innovations*, 4th edition (New York: The Free Press, 1995)

Sachs, 1976). In both the Bass and Sachs studies, the categories were simplified into two groups, i.e., innovators and imitators. While Bass agrees with Rogers' concept of innovators, Bass differs in a belief that all others are influenced by the decisions made by those who choose to adopt (Bass, 1969; Tanny & Derzko, 1988). Rogers' categories appear to be used most often in diffusion studies and are discussed below.

### Innovators:

Innovators make up 2.5% of the population and are the ground breakers. Early studies indicate innovators were looked down on by many in the social system for what was perceived as rash behavior (G. Watson, 1964). Later studies suggest innovators are adventurous and tend to seek out others who hold similar views (Rogers & Scott, 1997). A study by Ye, Fiedler and Park suggests that the more innovative an individual is, the greater the likelihood they will see the innovation as less complex and a good fit to solve a need or requirement (Yi, Fiedler, & Park, 2006). Innovators are also associated with several attributes that facilitate their decision to migrate to a new technology. First, they can commit the financial resources necessary to adopt the innovation. Second, they tend to be "technically savvy" and have the skills and knowledge necessary to make a new technology work. Third, they can work with high levels of uncertainty and stress (Rogers, 2003, p. 282; Rogers & Scott, 1997).

**Early adopters:**

The second category is that of early adopter. These are individuals who are seen to be judicious and thoughtful, and are the category most likely to generate opinion leaders (Rogers, 2003, p. 283). This group comprises 13.5% of the population and serves somewhat as a bridge between innovators and the remainder of the social system. Rogers states that the respect others in the social system have for early adopters makes them the "individual to check with" for advice and information about the innovation (Rogers, 2003, p. 283).

**Early majority:**

The third category, early majority, are the individuals who are relatively more cautious and deliberate when making a decision to adopt. This category makes up 34% of the population and includes people who tend to take much more time before they migrate to a new innovation (Rogers, 2003, p. 284). This group needs to see the capability of the innovation, how it can solve one of their needs, proof that it will work, and they will seek recommendations from their peers (Padgett & Conceicao-Runlee, 2000). Moreover, they serve an important function once they decide to adopt by applying peer pressure to those in the subsequent categories (Rogers & Scott, 1997).

### Late Majority:

The fourth category is late majority, and they are characterized by caution and skepticism. They mirror in size the early majority at 34% but are much slower to adopt. Peer pressure, risk, and financial constraints are three factors that influence the time it takes for this category to adopt (Rogers, 2003, p. 284).

### Laggards:

Those in the last category are called laggards by Rogers. This group comprises 16% of the population and generates the most resistance toward adopting. Laggards are typically non-adopters, are wary of change agents, tend to cling to the status quo and adopt only when social or economic pressure becomes too great to hold out (Rogers, 2003, p. 284).

### Characteristics of adopters:

Using his work and that of others regarding these categories, Rogers found several traits that can be attributed to adopters. First, while age does not seem to be a factor in innovativeness, overall it is somewhat discipline dependent. Other studies also found that the age of the adopter depends on the innovation being adopted (Dickerson & Gentry, 1983; Pedersen, 2005). Second, early adopters tend to be more educated, have a higher income, are more mobile and enjoy a higher social status than late adopters. Perhaps most importantly, early adopters are more favorably disposed toward change and have a higher tolerance for risk and uncertainty than later adopters. Last, Rogers states that

later adopters have lower expectations than early adopters and are often more fatalistic about adopting innovations (Rogers, 2003, p. 288).

### *Summary - Diffusion of Innovation*

Everett M. Rogers' work on how innovations are adopted, which he based on early agriculture and sociology studies, is the most compelling and comes the closest to offering a comprehensive theory of diffusion (Surry & Farquhar, 1997). Rogers believes that in every effort at diffusion, four elements are always present. He includes them in his definition of diffusion: "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 5). He calls these elements, the innovation, communication channels, time and the social system. Based on these elements he offers four theories that have become the most widely used in diffusion studies. These are: The Innovation Decision Process; Individual Innovativeness; Rate of Adoption; and Perceived Attributes.

The Innovation-decision Process has five stages which an individual or organization goes through before adoption takes place: knowledge, persuasion, decision, implementation, and confirmation. Each of these stages is influenced by the four elements described above.

The Individual Innovativeness Theory proposes that individuals will fall into one of five categories based on a number of factors. Individuals who are risk-takers and are predisposed to innovation are the innovators and will pioneer a new technology. They are followed by early adopters who are typically the opinion leaders. The early majority adopts next, followed by the late majority.

These two groups comprise 68% of the population. Laggards fall in the last category and must be coerced to adopt, if they do so at all (Rogers, 2003, p. 284).

The Rate of Adoption Theory states that an innovation can be graphed to show that diffusion begins slow, increases dramatically over time, matures and then falls off. The graph will take the shape of an S-curve shown on page 18 (Rogers, 2003, p. 23).

The Theory of Perceived Attributes addresses human characteristics and how a potential adopter views an innovation. Rogers suggests there are five attributes of each innovation, and the manner in which potential adopters perceive these attributes influences the likelihood of adoption. These are relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003, p. 15).

## Implementation

Once a decision is made to adopt an innovation, the next logical step is to implement it across an organization, but this was not always viewed as a significant part of the Innovation Migration Process. The term “implementation” did not come into use until the early 1970s and before that time was given little attention. People were adopting innovations and assuming they were being used and “the whole area of implementation, what the innovation actually consists of in practice and why it develops as it does, was viewed as a ‘black box’ where innovations entering one side somehow produce the consequences emanating from the other” (Fullan & Pomfret, 1977, p. 337). More often than not however,

the innovation fails to be completely adopted in business as well as higher education (Durlak & DuPre, 2008). Studies show that only one third of the attempts at change in the business sector are successfully implemented while 75% of companies attempting an implementation fail to see a return on their innovation investment. Another 42 % are terminated at some point before they are fully implemented (Day, 1999; Griffith, Zammuto, & Airman-Smith, 1999; Muehrcke, 1999). Higher education fairs no better when "implementing even a relatively minor change is often a difficult, frustrating and divisive process that fails to produce the desired results" (Ensminger & Surry, 2008; Ensminger, Surry, Porter, & Wright, 2004).

A number of studies began looking at reasons why innovations failed and found that many are unsuccessful because of poor implementation strategies and not due to any limitation of the innovation (Borins, 2001; Klein & Knight, 2005; Roberts, 2008; Surry & Ely, 2007). Fullan believes at least part of the problem is that the end-users are not entirely involved in the process of implementation, that "the consumers or users of innovations (teachers, parents, students) have had a limited role in this process, [and] are seen as relatively passive adopters of the best of recent innovations," meaning the focus was on the innovation rather than the user (Fullan, 2005, p. 205). He also established what has come to be a common definition of implementation, i.e., "members consistently using an innovation in a practical setting" (Fullan, 1996).

Even after decades of research, the implementation phase remains a misunderstood but critical part of the change process in both educational and

business settings (Ely, 1990; Roberts, 2008). Given that the success of an innovation is directly tied to its successful implementation, organizations must not only be aware of variables that facilitate implementation but also need a means for determining which variables are most important to their organization given a specific innovation. To fully understand the need for assessing variables, we must become familiar with some of the main models and strategies related to change.

In a 1995 article, Donald P. Ely also suggested that the process to implement innovation is very complex but may not be given the attention it deserves. "Some may think of [implementation] as 'marketing', others may talk about 'installation' while some would say it's just a matter of 'transfer'" but "all the careful efforts that have gone into designing and adopting a product will come to no result if implementation does not occur" (Ely, 1995).

Until recently, little research has been done to understand what an organization must do to successfully implement an innovation (Surry & Ely, 2007; Surry & Ensminger, 2003). Early studies focused their attention on resistance to adopting an innovation. The rationale was that if the reasons for resisting an innovation could be identified, then strategies might be devised to overcome these barriers. Zaltman and Duncan conducted an early study aimed at discovering these barriers and proposed a definition of resistance as "any conduct that serves to maintain the status quo in the face of pressure to alter the status quo" (Zaltman & Duncan, 1977). Subsequent studies looking at barriers to innovation suggest there are numerous reasons why individuals resist adopting

an innovation. These barriers can be classified as cultural, social, technological, and psychological (Berge, Muilenburg, & Haneghan, 2002; Pajo & Wallace, 2001).

Ely proposed that, rather than looking at the barriers to innovation, researchers should look at successful implementations and identify those conditions that facilitated success. This change in focus attempts to find "best practices" that lead to success, and he discovered eight conditions that when present, contribute to a successful implementation (Ely, 1990, 1999).

## *Ely's Eight Conditions for Implementation*

The following eight conditions are taken from Donald P. Ely's 1999 and 1990 work unless another source is cited.

1. **Dissatisfaction with the status quo:** This condition refers to the emotional belief that the current way of doing business is inefficient or that life could be better with something new. This may be a self-induced belief or due to external pressure placed on an organization such as market conditions and competition. Some strategies used to create this belief are product demonstrations, personal testimonies of others, attending conferences, trade shows, research findings and vendor marketing (Surry & Ely, 2007). This condition has many similarities to Rogers' relative advantage (Ensminger, et al., 2004).

2. **Knowledge and skills exist:** This condition refers to the need for the users to either already possess the skills and knowledge necessary to

use the innovation, or be willing to acquire them. It considers the users' level of self-efficacy about whether they are competent to use the innovation. Training is a significant component of this condition.

3. **Availability of resources:** Successful implementation requires adequate resources in the form of money, hardware/software, material, personnel and technical support. It is a reflection of the organization's commitment and how well it can support a successful implementation. The absence of one or more of these resources reduces the likelihood of success. Other studies also identified resources as an important component of implementation (Klein & Sorra, 1996; Pajo & Wallace, 2001).

4. **Availability of time:** There are two components of this condition. First, the organization must be willing to provide the users with paid time (rather than personal time) to learn the innovation and second, the users must be willing to devote the necessary time to develop the required skills and knowledge. This includes a belief on the part of the user that the innovation is not beyond their ability to master.

5. **Rewards and incentives exist:** A reward is something received when a condition is met, i.e., monetary gift or time off. An incentive is something offered in anticipation of a condition being met.

6. **Participation:** This condition refers to the level of contribution offered by everyone involved in the decision making process of whether or not to adopt the innovation. This provides a sense of ownership by the users.

7. **Commitment:** This condition refers to the level of involvement demonstrated by those in authority positions within the organization. Authority figures who are seen as committed to adopting the innovation by actions such as their personal communication, allocation of scarce resources and active participation have a greater influence on an implementation's success than those who do not.

8. **Leadership:** This condition refers to the level of enthusiasm and support provided by those in supervisory positions over the users. The immediate supervisors can influence implementation through their enthusiastic support of the innovation as well as by serving as role models. This role is seen as critical for a successful implementation (Ebersole & Vorndam, 2003).

Multiple studies show that the presence of these conditions are highly correlated to a successful implementation (Klein & Sorra, 1996; Kotter, 1996; Pajo & Wallace, 2001; Surry & Ely, 2007; Zhou & Xu, 2007).

A study by Ensminger et. al. sought to determine if there are underlying relationships between Ely's eight conditions. A 56 item survey was constructed to measure an individual's perceived importance of one condition when compared to that of another. The study indicated that all eight conditions are important and interrelated and that participants from different sectors perceived some conditions as more important than others. For example, participants from higher education viewed resources, skills and rewards as most important, while those from the business sector viewed participation, adequate resources and dissatisfaction as critical to implementation of a new technology (Ensminger, et al., 2004). Furthermore, Surry and Ensminger recommend that "anyone wishing to facilitate the implementation of an innovation in their organization use Ely's eight conditions as a guide" (Surry & Ensminger, 2003).

## *Summary of implementation*

Implementation is a key component of the Innovation Migration Process and is the subject of increased study in recent years. An innovation is considered implemented when adopters actually use it on a routine basis. The method of implementation appears to be specific to the social system.

Early studies looked at barriers to implementation, while later work sought to identify "best practices" and conditions that, when present, are positively correlated with success. Ely's work identified eight of these conditions: 1) dissatisfaction with status quo; 2) knowledge and skills exist; 3) availability of resources; 4) availability of time; 5) rewards/incentives; 6) participation; 7) commitment; and 8) leadership.

## *Diffusion models for Higher Education*

A number of efforts to guide implementation in educational settings were developed in the past thirty years, with two receiving the most attention, Havelock's Models and Concerns Based Adoption Model.

### Havelock's Models

In 1971 Ronald Havelock undertook a study to synthesize the current diffusion literature with the intent of developing a model that would help guide implementation campaigns in educational settings. His work resulted in three models that are commonly cited in the literature. The information on the following three models are taken from Havelock's 1971 work unless otherwise noted (Havelock, 1971).

### The Problem-Solver Model

The problem-solver model points to an external change agent who acts as the champion of the innovation, working to meet the client's requirements. Key to this model is the collaborative nature of the relationship between the agent and the client/organization. Havelock determined there are five stages in this model through which both the champion and the client negotiate. These are: discovery, need articulation, solution possibilities determined, solution selection, and solution application. This model is an iterative process in that once the solution is applied, the change agent should begin the discovery stage again to ensure the need is met.

## The Research, Development and Diffusion Model

Where the problem-solver model's focus is on the client, the research, development and diffusion model is focused on developing a solution to the problem. The nuance here is that the model places the emphasis on "building a better mousetrap" with the diffusion of the innovation coming afterward. The stages of this model follow this process: research of a solution, development of the solution, and adoption.

## Social Interaction Model

The social interaction model of diffusion relies on what Rogers defines as the "communication" between and among the adopters, peers, champions/change agents and those involved in the diffusion process (Rogers, 2003, p. 5). These interactions support an evolutionary process of diffusion rather than a revolutionary one.

## Linkage Model

The three models described above were a result of Havelock's study of the literature. From these, he developed what he called the Linkage Model which took the best practices from each of the other three. Central to this model is the need reduction cycle of the problem-solving model, the necessity of research and development to find creative solutions and the interaction among the stakeholders.

## *Concerns Based Adoption Model*

One of the most often used models to guide implementation of an innovation is Hall and Hord's Concerns Based Adoption Model (CBAM) (Hall & Hord, 1987). As the name suggests, CBAM focuses attention on the concerns of the adopter. It begins after the decision to adopt is made and the support mechanisms are in place (Ellsworth, 2000).

In their 1973 work, Hall, Wallace and Dossett suggest that an individual's concern about adopting an innovation will follow a progression from a concern about self, to the task being mitigated, to "ultimately, the individual becomes concerned about the impact he is making upon others and strives to optimize his efforts for others" (Hall, Richard C. Wallace, & Dossett, 1973, p. 6). To explain this progression and provide a way to determine where in the process an adopter might be, they developed a "stages of concern" rubric. These stages are: awareness, informational, personal, management, consequence, collaboration and refocusing. They see the change agent playing an important role in this model (Hall, et al., 1973). In a later study, Hall and Hord identified eight types of change agent interventions that have shown success in educational settings. These include: 1) information diffusion, 2) creating a context for change, 3) ensuring a shared vision of the innovation/change, 4) planning and providing resources, 5) checking on progress, 6) training, 7) providing continuous assistance, and 8) communicating the progress of the adoption process to others (Hall & Hord, 2001).

## *Faculty Development*

### Importance of Faculty Development

Teaching is a major component of the responsibilities placed on faculty in higher education. In 1869, when he became president of Harvard College, Charles W. Eliot declared "the prime business of American professors … must be regular and assiduous class teaching" (Boyer, 1990, p. 4). While faculty hold many other responsibilities, some of which are competing (Frost & Teodorescu, 2001; Gray, Froh, & Diamond, 1992), this concept remains true today; professionalism in the classroom is an important part of teaching. Common sense tells us that professionalism in the classroom comes through what Alfano calls "a myriad of activities that colleges undertake to enhance individual or institutional capacities to teach and serve students" (Alfano, 1993, p. 68).

There appear to be three technological factors that emphasize the need for faculty development. First is the changing characteristics of learners. In his widely cited article, *Digital Natives, Digital Immigrants,* Prensky says "Our students have changed radically. Today's students are no longer the people our educational system was designed to teach" and technology is the most significant reason why there is a gap between faculty and learners (Prensky, 2001, p. 1) although there is still some debate on this issue (Kennedy, Judd, Churchward, Gray, & Krause, 2008). Students today spend more time with technology, i.e., on a computer and the internet, than they do watching TV (Emanuel, et al., 2008; Jones, 2002; Prensky, 2001) and they expect technology to be used in the classroom.

Second is the increased capability of technology. Moore's Law, loosely defined as the doubling of computer processing power every 18 months (G. E. Moore, 1965), is expected to continue for the foreseeable future. The rate at which internet capability has doubled exceeds Moore's Law by a factor of two (Villazon, 2005).

The third factor underscoring the need for faculty development, is the variety of interactions between the instructor and the learner. Moore describes these interactions as being: 1) between learners and instructional content, 2) between learners and the instructor and 3) between learners themselves (M. G. Moore, 1989). Where early instructional technology limited interaction to between the learner and the instructional content, the robust nature of newer technology such as Web 2.0 and social networking allows interaction between the learner and the instructor and among learners to a much greater degree (Reiser, 2007, p. 23). The convergence of these three concepts: increased student use of technology, increased capability of technology, and increased interaction between the learner and instructor mean that those who attempt to teach must be comfortable with instructional technology in the classroom. This means teachers must modify their educational beliefs and values and embrace the concept of continuous learning (Tam, 1999).

## Barriers to Faculty Development

Most institutions of higher education have some form of faculty development incorporated into their program (Cook & Marincovich, 2009; Rouseff-Baker, 2002; Schonwetter & Nazarko, 2008, 2009). Consequently, most

college and university administrators view keeping faculty up to date as an important component of their mission (Cook & Marincovich, 2009). Some believe that "as faculty positions change and colleges grow and adapt with changing times, faculty improvement is a necessity, not an option" (Rouseff-Baker, 2002, p. 35), and a number of studies identified barriers that should be considered (Feist, 2003).

There is a dichotomy between how institutions view their role in faculty development and how faculty react to the changes. Faculty seem to be highly resistant to decisions forced on them by the administration, particularly when the faculty feel left out of the decision-making process. Early studies found that faculty are largely not interested in change but in maintaining the status quo (Bergquist & Phillips, 1975). In fact, it appears that more senior faculty view efforts at faculty development as unnecessary since they do not believe they need further development (Baek, Jung, & Kim, 2008; Schecter, Conway, Neylon, & Pemberton, 1999). Later studies show that younger faculty see a need to remain technically proficient in the classroom. In fact, this dichotomy "might have thrust the young, non-tenured, but technically prepared faculty into new and different leadership roles" to fill the void left by older professors who have little interest in technology integration (Lan, 2001, p. 399). While many faculty do make good use of technology in the classroom, "in spite of the sporadic successes and isolated pockets of innovation, … most faculty at most colleges make little use of technology as a tool for teaching (Surry & Land, 2000, p. 145).

The culture of the institution also plays a key role in influencing how and to what degree educational technology is used in the classroom (Lewis, Marginson, & Snyder, 2005; Nicolle & Lou, 2008; Sherry, et al., 2000; K. M. Smith, 2000). The organizational structure of a typical college or university having, 1) stovepipe disciplines, 2) specialized fields, and 3) being rewarded based on strong individual scholarly research make it difficult to foster discussions on issues related to teaching (Quinlan & Akerlind, 2000; Szabo & Sobon, 2003), a factor necessary for the effective integration of technology (Hagner & Schneebeck, 2001; Rogers, 2003, p. 290).

The attitude held by faculty also plays a key role in technology adoption. Some faculty see little advantage in using instructional technology. According to a study on teacher licensure, the lack of faculty interest in training was cited as a barrier to implementation by 73% of the participating institutions, with 3% citing it as a major barrier (Kleiner, Thomas, Lewis, & Greene, 2007). Other faculty are comfortable with their role as teacher and are reluctant to once again become a student faced with learning a new technology (Hagner & Schneebeck, 2001).

Faculty stress, caused by a lack of time, is another barrier to technology adoption. More than ever before, college faculty have more demands on their time, including teaching, advising, doing research and providing service to their discipline and university. “The constraint of time can be positively, negatively or not impacted by the adoption of technology and the expectation to continue to adopt new technology” (Schuldt & Totten, 2008, 13). The 1998-1999 Higher Education Research Institute report found that more than two-thirds of the

respondents (72.5%) cited among other factors, “keeping up with information technology” as the most stressful, outranking even promotion and tenure concerns (54%) (Wageman, 1999, Table 16).

## *Summary of Faculty Development*

Faculty development in higher education consists of interventions designed to enhance individual or institutional capacities to teach and serve students. Three technological factors drive the need for continued faculty development: 1) changing characteristics of learners; 2) increased capability of technology; 3) a shift from interaction between the learner and instructional content to interaction among the learners and between the instructor and the learner.

Barriers exist that impede faculty development. Faculty, particularly those from an older generation, resist personal development in the belief that they do not need it. The organizational structure and culture of an institution can inhibit communication among adopters. Attitudes held by the faculty also affect the Innovation Migration Process if they believe that technology is less important than traditional instruction. Additionally, some faculty may be reluctant to assume the role of student and are daunted by the challenge of learning new technology. Stress brought on by lack of time can also be a barrier to faculty development when faculty see learning a new technology as something else “piled on their plate.”

# Chapter 3 - Research Method:

## *Introduction to the chapter*

The purpose of this study was to discover the strategies used by post-secondary military institutions to bring new instructional technologies into their learning environment. This descriptive study investigated a purposeful sample of administrators, technical support personnel, instructional technology designers, and faculty at post-secondary military institutions engaged in leader development to determine: 1) the decision process institutions use to identify and adopt a new instructional technology, 2) the strategies used for diffusing the innovations within their organization, and 3) the methods used to train and develop faculty on the innovation. The research design was a mixed-methods approach using both quantitative and qualitative data, which sought to reveal in breadth and depth information that explains how leader development programs negotiate the Innovation Migration Process. As explained below, a mixed-methods approach provided the means to explore a wide array of adoption, implementation and faculty development information.

The purpose of this chapter is to: 1) describe the research methods used in the study; 2) explain the sampling technique; 3) describe how the survey and interview instruments were designed; 4) describe the administration of the data gathering; and 5) explain the procedures used for data analysis. The details of the research methods are described in the following sections: 1) research questions 2); research design; 3) population profile; 4) Phase I of the study; 5) Phase II of the study; 6) method of data analysis; and 7) summary.

## Research Questions

The purpose of this study was to identify how post-secondary military institutions of higher education adopt, implement and train their faculty on innovative instructional technology. The following questions were the focal point of this study.

**Research Question 1:** What are the strategies used by post-secondary military institutions to adopt (select) new instructional technology?

**Research Question 2:** What strategies are used to implement the adopted technologies within their institutions?

**Research Question 3:** How are faculty trained to make use of the adopted instructional technology?

## *Research Design*

This descriptive study used a mixed-methods approach to answer the research questions. The mixed-methods approach uses elements of different research methods in order to more fully explain a phenomenon. The design of this study was a quantitative survey followed by a qualitative case study to provide a description of the Innovation Migration Process used by post secondary military institutions.

The study was divided into two phases which were implemented sequentially. Phase I consisted of an online survey that identified the strategies and techniques used by the institutions that answer the research questions. The data gathered by the survey were used to identify an exemplary program that

served as a case study to provide a more in-depth analysis of the Innovation Migration Process.

Phase II of this study was a qualitative case study designed to take a closer look at the exemplary institution identified in Phase I. The purpose of Phase II was to identify those strategies and practices that appear to have the greatest success in migrating to a new instructional technology.

The combination of methods used the strengths of both quantitative and qualitative research designs, which "bases the inquiry on the assumption that collecting diverse types of data best provides an understanding of a research problem" (Creswell, 2003, p. 21).

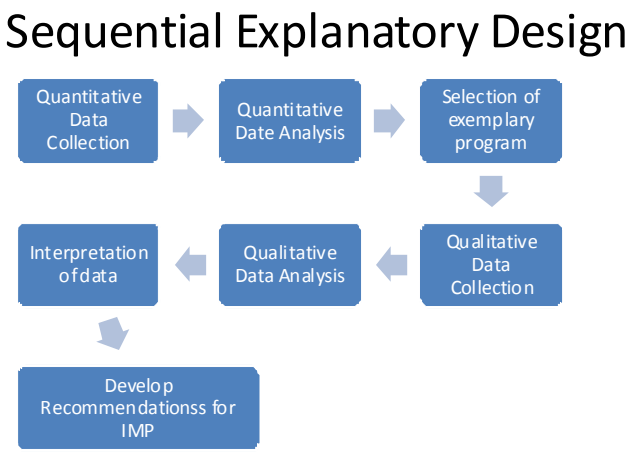



Chart 3.1

The study began with a broad survey in order to generalize results to a population and then focuses, in a second phase, on detailed qualitative, open-ended interviews to collect detailed views from participants. Chart 3.1 depicts the sequence graphically.

## *Description of Mixed-Methods Designs*

Greene, Caracelli and Graham define mixed-methods designs as "those that include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of method is inherently linked to any particular inquiry paradigm" (Greene, Caracelli, & Graham, 1989, p. 256). While there are numerous definitions of mixed-methods, this seems to be the most prevalent. In a study done by Johnson, Onwuegbuzie and Turner, they found nineteen definitions of mixed-methods research. Taking common themes from fifteen of the nineteen, they offer a definition as "the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration" (Johnson, Onwuegbuzie, & Turner, 2007, p. 123). This approach allows the researcher to take a very open view of answering the research questions "rather than restricting or constraining [the] researcher's choices," which permits a focus on the research questions with a greater "chance to obtain useful answers" (Johnson & Onwuegbuzie, 2004, p. 17).

Greene et. al. conducted a fairly extensive study on mixed-methods and concluded there are five major purposes for conducting mixed-methods research. These are: 1) triangulation, which seeks to corroborate the results of different methods and designs that analyze the same phenomenon; 2) complementary, which seeks to clarify, elaborate or illuminate the results of one method with that

of another; 3) initiation, which identifies contradictions about the phenomenon that drive the researcher to re-frame the research questions; 4) development, which describes using the results of one method to inform the other; and 5) expansion, which seeks to expand the scope of the research through use of multiple methods, looking at different aspects of the same phenomenon (Greene, et al., 1989).

McMillan contends there are three types of mixed-methods: explanatory, exploratory and triangulation (McMillan, 2007). Each has different objectives and is characterized by a different sequence of events. Explanatory designs begin with quantitative (explain) data collection, followed by qualitative (explore) efforts. This design is typically used when the phenomenon being studied is well known but not well understood. Exploratory designs begin with a qualitative analysis in order to identify aspects of the phenomenon that must be explained using a subsequent quantitative analysis. This design is typically used when a phenomenon is not well known and requires some exploration to narrow down key aspects of the research. A triangulation design uses both quantitative and qualitative approaches simultaneously and operates under the premise that all methods have inherent biases and limitations and therefore, by using multiple methods, the strengths and weaknesses will offset each other (Greene, et. al., 1989).

The research design for this study falls under McMillan's explanatory category and aligns with Greene, et. al.'s purpose of development. In other

words, the researcher used an explanatory, sequential design intended to answer the research questions.

## Population Profile

The population for this study was a purposeful sample consisting of 19 military institutions whose mission is to develop leaders for the nation. The purposeful sampling strategy permits an in-depth understanding of the phenomenon and allows the researcher "to select information-rich cases whose study will illuminate the questions under study" (Patton, 2002, p. 46). Specifically, this population consisted of the following institutions: The Citadel, North Georgia College and State University, Norwich University, The State University of New York Maritime College, Texas A&M University, U.S. Air Force Academy, U.S. Coast Guard Academy, U.S. Merchant Marine Academy, U.S. Military Academy at West Point, NY, U.S. Naval Academy, Virginia Women's Institute for Leadership, Virginia Military Institute, Georgia Military College, Marion Military Institute, Maine Maritime Academy, New Mexico Military Institute, Valley Forge Military Academy, Wentworth Military Academy, and Virginia Polytechnic Institute and State University (Virginia Tech).

These institutions fall into the following categories: federal service academies, 5; senior military colleges, 6; junior military colleges, 5; other, 3. Appendix M is a matrix with additional data on the institutions.

## *Phase I – Quantitative Survey*

Phase I of this study was a cross-sectional, quantitative survey (Babbie, 2007) designed to collect data regarding perceptions, motivations and methods used in the Innovation Migration Process. This required the use of a self reporting survey with mainly closed choice responses. The advantage of this type of instrument is that they "can be designed and used to collect vast quantities of data from a variety of respondents ... they are usually inexpensive to administer; very little training is needed to develop them; and they can be easily and quickly analyzed once completed" (Wilkinson & Birmingham, 2003, p. 8).

### Purpose of the Survey

Survey research is used so that one may generalize from a sample to a population so that inferences can be made about some characteristic, attitude, or behavior of the population (Babbie, 1990, p. 51). The purpose of this survey was to explore answers to the three research questions: 1) what are the strategies used by post-secondary military institutions to adopt (select) new instructional technology? 2) what strategies are used to implement the adopted technologies within their institutions? 3) how are faculty trained to make use of the adopted instructional technology? The data gathered from the survey identified the

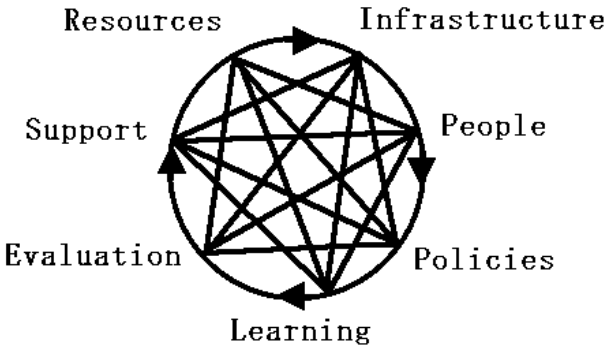



Chart 3.2
RIPPLES Element Relationship
(used by permission)

institution in the Innovation Migration Process. Analysis of this data identified an exemplary organization that served as the focus of Phase II.

## The Survey Instrument

The survey used for this study was a modified RIPPLES instrument which was designed specifically for surveying instructional technology in higher education. Developed by Dr. Daniel Surry, Associate Professor in Instructional Design and Development at the University of South Alabama, and Dr. David C. Ensminger, Clinical Assistant Professor in the School of Technology program at Loyola University, Chicago, RIPPLES is a generic model used for assessing the integration of instructional technology into higher education. It addresses seven elements thought by Surry and Ensminger to be critical in the Innovation Migration Process. These are: Resources,
Infrastructure, People, Policies, Learning, Evaluation, and Support, which make up the acronym RIPPLES. Surry believes these elements are not linear, but are interdependent (Surry, 2002). Chart 3.2 shows the relationship among these elements.

To support Phase I of this study, the survey was modified with approval from Surry to include a section on strategic planning (Surry, 2009, Appendix B). The sections are: demographics, resources, infrastructure, people, policies, learning, evaluation, support and strategic planning. The modified survey is found at Appendix C and is labeled RIPPLES(S) to acknowledge the added strategic planning section. The following is a brief description of each section.

**Demographics:** Section one of the survey collected demographic data of the respondents with a particular emphasis on job classification. This data was used to identify contradictory views and beliefs between and among those having different roles and responsibilities within the institution. This section also identified the institution of the respondent for data analysis purposes and to permit selection of the exemplary program for the Phase II case study.

**Resources:** Resources include the source of funding and the costs associated with implementing a new technology, as well as the time given or required for completing the Innovation Migration Process.

**Infrastructure:** Section three refers to all the technologies associated with bringing new instructional technology into the learning environment. This includes communication systems, teaching resources, networks, hardware, software, and administrative and production facilities.

**People:** Section four addresses the social and human elements of the institutions. Specifically, this section sought to identify the level of shared decision making that exists in the institution among the stakeholders who are directly or indirectly responsible for making decisions that affect the Innovation Migration Process.

**Policies:** Section five sought information on how the rules, practices, and regulations that govern the organization's day-to-day operations affect the Innovation Migration Process. Included in this section were questions on whether the participant believes the policies are an enabler or barrier to establishing new technology in their learning environment.

**Learning:** Section six addresses the learning environment at the institution. This section sought to determine the level of consideration given to learner outcomes as part of the decision making process. In other words, how much emphasis is placed on the learner's educational needs when planning for new instructional technology?

**Evaluation:** Section seven sought to determine how the institution evaluates the new instructional technology. This was accomplished by asking if evaluations are conducted and how effective the participants believe them to be.

**Support:** Section eight addresses the level of technical support provided by the institution. This includes: 1) formal and informal instruction required to effectively use a new instructional technology; 2) technical support for hardware, software and network problems; and 3) pedagogical support to faculty related to applying innovative teaching practices using the new instructional technology.

**Strategic Planning:** Section nine sought specific information on the methods and strategies used by an institution to adopt, implement and train faculty on new instructional technology. These series of questions asked the level of influence the respondent believes he/she has on the process and asked him/her to rank order the top two: 1) reasons why their institution will choose to begin the Innovation Migration Process; 2) methods used to identify potential technologies; 3) methods used to adopt/select the new instructional technology; 4) methods used to implement the new instructional technology; and 5) methods used to train faculty in the effective use of the new instructional

technology. Additional questions asked if the institution used incentives and/or rewards to facilitate knowledge and use of the instructional technology.

The last portion of the survey explained Phase II of the survey and asked if participants would consent to participate in an interview if their institution is selected for the Phase II case study. Questions soliciting their name and email addresses were included and used to identify individuals to interview at the selected institution. Participation in Phase II was entirely voluntary and if individuals did not wish to participate, they simply ignored those questions.

### *Summary of RIPPLES(S)Survey*

The RIPPLES survey is a well researched and comprehensive model designed to assist decision makers in higher education to negotiate the Innovation Migration Process (Ensminger, 2008; Jasinski, 2007). The name is an acronym representing the seven components of the model: resources; infrastructure, people, policies, learning, evaluation, and support. The RIPPLES model was modified for this study to obtain additional information on demographics and to include a section on strategic planning. The survey used in this study is labeled RIPPLES(S) to identify the inclusion of the last section on strategic planning. This survey instrument is well aligned with the intent of this study and served as the framework for Phase I.

## Implementation of Phase I

Pilot Study Procedures

Phase I of this study included a pilot study of the implementation procedures for the survey. The purpose of the pilot study was threefold. First was to identify and correct any grammatical and typographical errors in the questions. The second purpose was to determine a reasonable completion time that could be included in the survey instructions. The third purpose for the pilot study was to collect data for a "mini-analysis" with the intent of clarifying any instructions, procedures, and wording of the questions.

In order to establish content validity, the link to the RIPPLES(S) survey was sent to Dr. Surry, the RIPPLES survey co-designer, with a request that he review and comment on the validity of the survey for the purposes of this study (Surry, 2010). He suggested that "overall, it looks really good to me" and offered a few changes. Appendix D shows the suggested changes which were made to the survey prior to the pilot test. The implementation procedures were approved on 1 Feb 2010 and the pilot study was conducted in a computer lab on 3 Feb 2010.

The survey was keyed into an online survey tool administered by Virginia Tech in preparation for the pilot study, and is found in Appendix C. The informed consent form was placed online and was the first document the participant was presented after clicking on a link in the emailed invitation to participate. Clicking on the PROVIDE CONSENT button of the consent form acknowledged the participant understood and gave consent to participate. An email was

automatically sent to the researcher for notification that a survey was being taken, and the participant was redirected to the survey. If participants chose not to take the survey, they simply closed their browser.

The pilot study consisted of three stages and four people familiar with the Innovation Migration Process were invited to participate. The first stage mirrored the notification procedures of the formal study by emailing each person with an invitation to participate in the survey (Appendix E). The procedure was explained to the participants, and they were asked to check their email to begin the pilot study. The start time was recorded when the participants opened their email and began to follow the directions of the invitation email. Embedded in the email was a link to an online informed consent form (Appendix F). The instructions asked them to follow the link and read the informed consent form. When they completed this task, they were asked to raise their hand to signify they were ready to begin the survey.

Clicking on a 'PROVIDE CONSENT' button at the bottom of the form acknowledged their consent to participant and automatically redirected their browser to the online survey. The time in which each participant completed this step was recorded on a matrix. Once each participant completed the survey, they were asked to again raise a hand and the finish time was noted on the matrix. The pilot survey revealed that it took an average of 2 minutes and 45 seconds to complete the informed consent form and an average of 14 minutes and 43 seconds to complete the survey. Table 3.1 shows the data for each participant in the pilot study.

**Table 3.1**

**Pilot study completion times**

| Participant | Consent Form | Survey |
|---|---|---|
| Participant 1 | 2.15 | 16.05 |
| Participant 2 | 2.39 | 10.35 |
| Participant 3 | 4.05 | 15.41 |
| Participant 4 | 2.15 | 16.06 |
| Average | 2.45 | 14.43 |

This information was added to the RIPPLES(S) instructions in preparation for sending out the formal survey.

Once all participants completed the survey, the next stage of the pilot study began. The participants were given a hardcopy of the invitation email, the follow-up email, the informed consent and the survey. They were asked to write their name at the top of each form and to feel free to make notes and provide feedback directly on each form. Their names were sought to facilitate any follow-up questions regarding feedback forms. The specific instructions were to circle typographic and grammatical errors, provide comments on procedures, identify any ambiguities and suggest means of clarification of each document. The participants were encouraged to provide any thoughts and suggestions as they reviewed the documents.

The last stage of the pilot study began when all participants finished commenting on the documents. This stage consisted of a focus-group format discussion that gave the participants an opportunity to hear and respond to the insights and perceptions of their pilot colleagues. During this session, the

participants were free to ask about the intent of the study, the research design and any general points about the research they found interesting.

The following improvements and/or corrections were made to the RIPPLES(S) survey based the data collected from the pilot study. They are divided into procedural corrections which were those that inhibited the participant from getting to the informed consent form or the survey, typographical errors and improvements to the questions.

**Procedural corrections:** A procedural problem became immediately apparent when the participants attempted to open the link in the email that would take them to the informed consent. The link worked during pre-trials, but when the participants attempted to access the informed consent, they were required to key in a password. This was due to a permissions setting on the server, and once changed to permit access to everyone, the link worked as intended.

**Typographical errors:** Several corrections were made to the text in both the informed consent form and the survey. This included one instance of changing RIPPLES to RIPPLES(S), removing a second period from the end of a sentence, deleting a double word and removing additional spaces around a word in the survey.

**Improvements to questions:** A response of “Don’t know/unsure” was added to several questions and the question that asks the role of the respondent was changed from single selection to ‘check all that apply’. This became obvious when the participants suggested a respondent could hold dual roles as faculty as well as a decision-maker.

Formal Survey Procedures

Points of contact at each of the population institutions were identified and asked to serve as the focal point for their institution (Appendix G). In order to reduce the time and effort required to administer the survey, electronic mail was used for all correspondence. The points of contact were asked to collect contact information including email addresses of individuals serving as administrators/decision makers, faculty, technical support, and instructional designers at their institution.

Approval to conduct the study was given by the Institutional Review Board on 4 Feb 2010 (Appendix A) and with the committees consent, the survey was begun on 5 Feb 2010 by sending an initial email to each point of contact. The email requested their assistance for the study and asked them to broadly distribute the survey to individuals at their institutions who fit the categories and who were interested in participating. The points of contact were also asked to complete the survey.

In the email sent out through the points of contact, the respondents were asked to complete the survey within one week. A follow-up email (Appendix H) was sent to all POCs asking them to send out a reminder to the individuals at their institution to complete the survey if they had not done so. This email was sent out on 10 Feb 2010 and a final reminder (Appendix I) was emailed on 14 Feb 2010. The final reminder email was sent only to those institutions with a low response rate.

## *Phase II – Qualitative Case Study*

Phase II consisted of a case study of a leader development program. The purpose was to explore in-depth how an exemplary program adopts, implements and trains their faculty for use of a new instructional technology. The data collected from the Phase I survey permitted the researcher to rank order the institutions based on respondents' answers that report how successful they believe their institution is at migrating to a new instructional technology.

### Case Study Selection Criteria

The case study selection was based on the point value associated with each possible response for a question. The questions were designed using a Likert scale that provided each respondent with a range of answers that correlated to their understanding of how their institution negotiated the Innovation Migration Process. The majority of questions permitted only one response. Individual answers for each question were assigned a value based on a positive correlation. For example, Question 5 asks how the respondent would rate the level of financial resources for selecting an innovation to use in the learning environment. An answer of 'high' received a score of five, 'above average' receives a score of four and so on until 'don't know' was scored with a zero. The frequency of response for each question was calculated and totaled by institution. The exemplary institution identified by the survey would be the one with the highest numerical score. See Appendix C for the point values for each question.

## Design and Rationale for Case Study Research

Merriam defines case study research as a type of qualitative research involving a holistic description and analysis of a single phenomenon, i.e., a "bounded system" (Merriam, 2009, p. 27). According to Robert Yin, this type of research is appropriate when: 1) the researcher seeks answers to how or why types of questions, 2) the researcher has little or no control over what is being studied, 3) the study is looking at contemporary phenomenon in a real-life context, 4) the boundaries between the phenomenon and the context are not clear, and 5) it is desirable to use multiple sources of evidence (Yin, 2009). The present study met each of these conditions, and the case study method was selected as the design for Phase II.

This case study was designed around interviews, both in-person and telephonic, as the means of data gathering. The purpose of an interview is to develop an in-depth understanding of the experiences of other people and the meaning they place on those experiences (Seidman, 2006; Yates, 2004). In this study, the interview method was used to expand on the data collected in Phase I to determine the best practices in the Innovation Migration Process. The interviews established background context by interacting directly with the participants, thereby gaining insight about the issues being researched (Russ-Elft & Preskill, 2009).

## Interview Protocols

The survey instrument served as the guide in developing questions for the interview. The questions for the interviews were largely based on the strategic

planning section of the RIPPLES(S) survey because of the focus on the decision making aspect of the Innovation Migration Process. Limited questions from the other seven sections were included as they relate to Ely's eight facilitating conditions, but were kept to a minimum to avoid a lengthy interview. The same interview protocol was used for each person and is found in Appendix J.

## Pilot Study Procedures for Case Study

Phase II of this study included a pilot study conducted in a manner similar to Phase I. Since an interview is more free-form with the opportunity for the interviewee to ask clarifying questions, the purpose of the pilot was to correct typographical and grammatical errors and eliminate ambiguous phrasing. An additional purpose was to get "useful feedback on the structure and flow of [the] intended interview" (Wilkinson & Birmingham, 2003, p. 52).

The pilot testing for the interview protocol was held on 12 Feb 2010. The participants were attendees from the population institutions who were attending a leadership conference at Virginia Tech. A special session for the attending delegates was scheduled, and volunteers were asked to assist with the pilot test.

One participant was asked to serve as the interviewee while the remainder observed. The interview protocol was followed, timed and recorded for later analysis. When the interview was complete, the interviewee was asked for general comments about the process, including any questions he did not understand. Following this, the observers participated in a focus-group to discuss how to improve the interview.

The overall consensus was that the interview questions were clear, followed a logical pattern and served the purpose of getting pertinent data. The interview took 36 minutes to complete.

## Legitimation (Trustworthiness)

It is important that research produce data that is valid and reliable, i.e., can be trusted in its accuracy; without this, any research findings are suspect. This concept is termed validity in quantitative research, however, in qualitative research there is disagreement as to whether or not the term validity can legitimately be used. This term has long been associated with the quantitative conceptualization of the research process and has generally been replaced by the term trustworthiness within qualitative research. There remains some discussion on how to address and label this concept in mixed-methods research. Since mixed-methods draw upon the strengths of both quantitative and qualitative research, assessing validity of this type of research is particularly complex. Onwuegbuzie and Johnson call this a problem of integration and recommend "that validity in mixed research be termed legitimation in order to use a bilingual nomenclature" (Onwuegbuzie & Johnson, 2006, p. 48).

For this study, the legitimation of the findings was established through the use of triangulation of data sources from in-depth interviews involving interviewees with different perspectives, member checks (rephrasing responses back to the interviewees for confirmation and additional clarification) and "rich,

thick, detailed descriptions so that anyone interested in transferability will have a solid framework for comparison" (Merriam, 2009, p. 27).

## *Method of data analysis*

### Quantitative data analysis – RIPPLES(S) survey

The analysis of the survey data was a multi-step process. Prior to any analysis, each response was checked for completeness and unusable cases such as incomplete surveys were removed. Next, the frequency of each question response was calculated and the responses for each question were totaled based on the point values assigned to each answer. Chart 3.3 is an example of how point values were assigned. Appendix C lists the survey questions with the associated response point value.

Example of survey raw data

| Q 1 | | R1 | R2 | R3 | R4 | R5 | R6 | R7 | |
|---|---|---|---|---|---|---|---|---|---|
| A1 = 5 | | | | | 5 | | | | |
| A2 = 4 | | | 4 | | | | 4 | | |
| A3 = 3 | | 3 | | | | | | | |
| A4 = 2 | | | | 2 | | 2 | | | |
| A5 = 1 | | | | | | | | 1 | |
| A6 = 0 | | | | | | | | | |

**Legend**

Q 1 = Question 1 R1… R7 = Respondents 1 – 7
A1.. A6 = Answers 1 – 6 selected by respondent

Chart 3.3

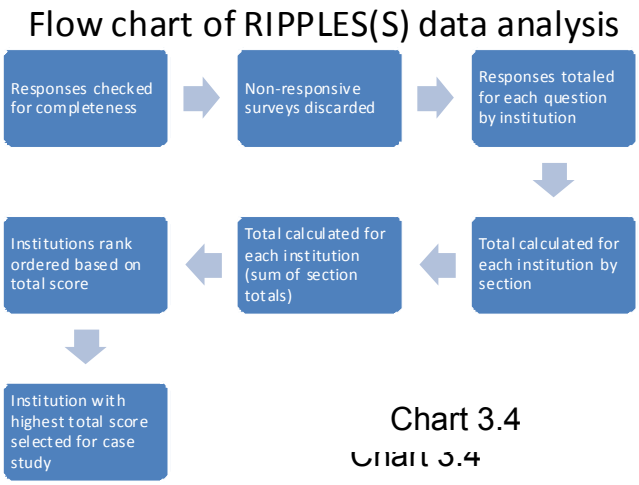



Chart 3.4

Chart 3.4

The responses were then categorized by survey section and a total score calculated for each section by institution. This resulted in a total score by institution for each section of the survey. The section values were then totaled for each institution, which allowed the institutions to be rank ordered based on their total score. The exemplary program, relative to the others, was the institution that scored highest and was selected as the case study for Phase II. This method also permitted refinement of the interview protocol based on the survey answers. Chart 3.4 is a graphical depiction of the method of data analysis conducted on the survey.

**Quantitative data analysis – Interview protocol**

There is no formula that exists that tells a researcher how to analyze qualitative data, but the process is one that "transforms data into findings" (Patton, 2002, p. 432). It involves making sense of the data by consolidating, reducing and interpreting people's views and actions (Merriam, 2009). This guidance was used during qualitative analysis where common themes were identified, categorized and triangulated with the quantitative data.

Following the case study data collection, the data were analyzed and coded using confirmatory codes taken from the three research questions. Common themes and patterns were identified, and these became the major discussion points of the study. Pertinent documents were sought from the exemplary institution for the purpose of triangulation and an opportunity to search for confirmatory codes.

## *Summary of Methods*

The purpose of this study was to identify how post-secondary military institutions adopt and implement new instructional technology, and how their faculty are trained to use it effectively in the learning environment. The research was a two-phased descriptive case study using a sequential mixed-methods design with Phase I being a quantitative survey to identify an exemplary institution to serve as a case study. Phase II was a qualitative set of interviews to provide in-depth knowledge of the Innovation Migration Process. The intended result of this design was to identify best practices and develop a set of guidelines that, if followed, may increase the chance of success when migrating to a new instructional technology.

# Chapter 4 - Research Findings

## *Introduction to the chapter*

The purpose of this study was to identify successful strategies used by post-secondary military institutions when migrating to new technology in their learning environment. The study was based on Everett M. Rogers' Diffusion of Innovation theories, Donald P. Ely's Eight Conditions of Implementation and the instructional technology diffusion work primarily of Daniel W. Surry and David C. Ensminger (Ensminger & Surry, 2008; Ensminger, et al., 2004; Rogers, 2003; Surry, 2002; Surry & Brennan, 1998; Surry & Ely, 2007; Surry & Ensminger, 2003).

Using a phased approach and a mixed methods design, Phase I was a survey of nineteen military institutions of higher education targeting respondents from four categories: decision-makers, faculty, instructional designers and technical support personnel. The purpose of Phase I was to gather data about the Innovation Migration Process and identify an institution that reported a relatively high level of satisfaction in bringing new technology into the learning environment.

Phase II of the study consisted of interviews of selected individuals working at the institution identified in Phase I. The purpose of these interviews was to identify the factors that lead toward a successful migration to a new technology.

The findings of this study are reported in this chapter under the following subsections: 1) demographics of the survey respondents; 2) selection of the Phase II case study; 3) survey data analysis; 4) implementation of the interviews; 5) interview data analysis; 6) findings for research questions; and 7) summary of the findings.

## *Demographics of the Survey Respondents*

One hundred twenty one educators from the target population completed the survey. The method used to distribute the invitation to participate was through individual points of contact at each of the nineteen institutions who in turn, distributed the survey to their organizations. Therefore, it was not possible to determine the rate of response.

In order to capture data from a diverse set of perspectives, the survey included several questions requiring the respondents to identify some characteristics about themselves. They were asked to identify their gender, age and the role they perform at their institution.

**Gender:** Table 4.1 shows the breakdown of gender.

*Table 4.1*
What is your gender?

| | Frequency | Percent |
|---|---|---|
| Male | 77 | 64% |
| Female | 38 | 31% |
| Prefer not to answer | 5 | 4% |
| No Answer | 1 | 1% |

The majority of respondents were male (64%) which is consistent with the percentage of male/female instructors at military institutions of higher education. For example, the United States Military Academy at West Point has 359 faculty of which 101 are female equating to a percentage of 29.1. Wentworth Military Academy has 14 full-time instructors of which five are female for a percentage of 37.7. Similarly, the United States Coast Guard Academy has 44 full-time faculty with 15 being female for a percentage of 34 (University-Directory, 2010).

**Age:** Table 4.2 is the breakdown by age of the respondents. This table shows the majority of respondents fell in the range of 35 to more than 55 years of age. This suggests most of the respondents are middle to late in their career.

*Table 4.2*
What is your age?

| | Frequency | Percent |
|---|---|---|
| Less than 25 | 0 | 0% |
| 25 to 34 | 12 | 10% |
| 35 to 44 | 32 | 26% |
| 45 to 54 | 37 | 31% |
| 55 or more | 34 | 28% |
| Prefer not to answer | 6 | 5% |
| No Answer | 0 | 0% |

**Role:** Table 4.3 is the breakout of respondents according to the role they fulfill at their institution. Respondents were allowed to select as many of these roles as were applicable to their responsibilities. There were 163 roles selected by the 121 respondents, which shows 42 of the respondents carry more than one responsibility. The distribution of respondents by role shows the majority are faculty, and are either full time, research or adjunct faculty. This accounts for 62 of the 162 responses. The next largest group was managers at 26 (29%). This group is defined as those in a direct support role to a teaching program, which includes department heads. Fourteen respondents (9%) selected 'other' as their role. Those who selected 'other' described their role as follows: three ROTC instructors, one tactical training officer, one cadet training officer, one graduate teaching assistant, one director of online programs, one commander/department head, three administrative professional faculty, one content administrator and trainer, one LDC staff and one leader development officer. Table 4.3 shows these roles as 'Other' even though there is some overlap with the defined categories.

*Table 4.3*
*What role(s) do you have at your institution?*

| | Frequency | Percent |
|---|---|---|
| Executive - Decision Maker | 22 | 18% |
| Manager | 26 | 21% |
| Full- time teaching faculty | 48 | 40% |
| Full-time research faculty | 2 | 2% |
| Adjunct faculty | 13 | 11% |
| Graduate teaching asst | 0 | 0% |
| Technical support | 10 | 8% |
| Instructional designer | 12 | 10% |

| | | |
|---|---|---|
| Professional staff | 16 | 13% |
| Other | 14 | 12% |

## *Selection of Phase II case study*

The survey was closed on 18 February 2010 with 121 responses. There were 148 respondents who completed the informed consent form, and 123 who began the survey. Therefore, 25 respondents chose not to take the survey after reading the informed consent form. Two respondents did not complete the survey once they began.

*Following the case study selection method described in detail in Chapter 3, the survey data was exported into an Excel spreadsheet and the names of the institutions were randomized and assigned a letter to protect anonymity. The two incomplete responses were discarded and the answers to individual questions were scored according to the tables shown in Appendix C. Once all the answers were assigned the appropriate value, the database was sorted by institution. The values for each question were totaled and divided by the number of responses for that question to account for the questions a respondent chose not to answer. This produced an average score for each question by institution. The average scores were then totaled for each institution, arriving at a grand total. The institutions were then rank ordered based on their grand total.*

*The top two institutions, 'D' and 'F' were virtually tied with a score of 79.66 and 79.65 respectively. These two scores were substantially higher than the institution in third place at 72.60 and well above the score of the fourth place institution at 67.12. Therefore, the top two institutions were treated as a virtual organization and arrangements were made to conduct interviews at both institutions. These two institutions are referred to in the plural as the exemplary institutions. The remaining institutions are referred to as the 'other institutions.' Appendix L shows the average scores by institution.*

## *Analysis of the survey data*

As described in Chapter 3, the RIPPLES(S) survey consisted of 49 questions, divided into eight sections. Appendix C shows the questions in table format with frequency, percent, and the assigned point value where applicable. Some questions

permitted open-ended responses, and these are not listed as tables but are included in the analysis of the data.

The eight sections were analyzed by providing a narrative description of each question and analyzing the data at the end of the section. Where comparisons could be made, the average scores of the exemplary institutions were compared with those of the other institutions.

Each answer had a possible value of between one and five, therefore, the mean score was calculated as the average of the possible point values, or 2.5. In some cases, the exemplary institutions' average score and that of the other institutions was compared against the mean score. This permitted not only a comparison between the two groups, but also a comparison between an average value and the respondents' perception of where their institution ranked against the mean.

**Section 1: Resources**

Questions 5, 6 and 7 asked the respondents to characterize their institution's level of resourcing for the Innovation Migration Process in terms of funding (question 5) and time (question 6). Compared against a response of 'average,' 34% of the respondents stated their level of funding was above average (26%) or high (8%). Twenty-one percent said their institution's level of funding was below average (9%) or low (12%) with 8% unsure or did not know.

Similarly, 37% of the respondents reported an above average (30%) or high (7%) amount of time allotted for the Innovation Migration Process, while 23% believe the time

given was below average (14%) or low (9%). Four percent were unsure or did not know.

Question 7 asked for comments on their institution's resource allocation and 35 people provided a response. Funding was the resource cited most often as a critical issue, with eleven people saying funds were scarce for new instructional technology. Some responses were nuanced by saying that funding seemed available for hardware and software, but little was provided for support. One person remarked, "Often wonderful technologies are implemented without consideration of what happens when that technology fails for some reason." Another said, "We adopt, but we don't always offer adequate support services."

Five respondents cited time as a critical resource and offered somewhat different reasons. Several said competing demands was the biggest issue, trying to get to much accomplished within the limited amount of time they have. One respondent characterized it by saying, "time is the 'coin of the realm at [institution].' Due to the many competing demands on our time, we rarely have sufficient time to adequately allocate towards implementation and training of innovation in the learning environment." He went on to say they dedicate time to this at the beginning of each academic semester so it is concentrated and not scattered throughout the year. Another respondent offered a similar complaint, "We talk about setting aside the time, but it comes at a cost to other initiatives or the individual's own schedule, because concurrent responsibilities are not reduced." Three people spoke of time in terms of hiring expertise to help them with technology. One respondent summed it up by saying, "We are about to hire an instructional designer - this will be an IMMENSE help in designing

and supporting online work." The implication being that this will free up his time to focus on other aspects of his job.

Comparing the average score of the exemplary institutions with that of the other institutions in the survey shows that adequate funding and time are important factors of the Innovation Migration Process. The average score of the exemplary institutions was 3.75 for funding compared with 2.68 for the other institutions. The difference in scores was less pronounced regarding time with 3.46 for the exemplary institutions compared with 2.91 for the others.

**Analysis of Resource Section**

The survey responses show that time and funding are important to the institutions and that most respondents are satisfied with the amount of funds and time allocated to the process. For both questions, the majority of respondents believe the level of funding is average or above (71%) and sufficient time is provided (73%). Comparing responses from the exemplary institution with those of the other institutions suggests a disparity between the two groups. While both groups' average score was above the mean of 2.5, the exemplary institutions scored substantially higher for both funding and time.

The importance the respondents placed on these resources is consistent with Rogers' research on the diffusion process. He describes time as the third element in the diffusion process and says it is an important element in "(1) the innovation-diffusion process, (2) innovativeness, and (3) an innovation's rate of adoption" (Rogers, 2003, pp. 20, 37).

Where the RIPPLES(S) survey combined funding and time under the section on resources, Ely's Eight Conditions address time and resources separately as the availability of time and the availability of resources. Both are important; according to Ely having sufficient resources, "is probably most self-evident of all" the eight conditions and he goes on to say "without [resources], it is almost impossible to implement changes that require such support materials" (Ely, 1990, p. 300). He goes on to say time means "good time --- company time, paid time arranged for by the organization where the innovation will be implemented" but also that the individual may need to devote some of their personal time (Ely, 1999, p. 4). Ensminger and Surry suggest time also represents an "individual's belief that, with time they can successfully adapt to the change" (Ensminger & Surry, 2008, p. 615), and Klein and Sorra believe an important consideration is the need for the practitioners to have time to get comfortable with the innovation (Klein & Sorra, 1996). Other studies agree that inadequate resources are a barrier to the Innovation Migration Process (Ebersole & Vorndam, 2003; Pajo & Wallace, 2001).

**Section 2: Infrastructure**

Questions 8 and 9 asked the respondents to rate the ability of their institution's infrastructure to support new learning technologies (question 8), and whether or not their infrastructure acts as a barrier or an enabler for using the innovation in their learning environment.

The highest percentage of respondents (47%) rated their infrastructure support capability as above average (39%) or high (8%). Twenty-four percent rated their level of

support as below average (21%) or low (3%), with a slightly higher percentage (28%) being average.

The majority of respondents (54%) believe their infrastructure serves as an enabler for the Innovation Migration Process with 15% saying it is a slight enabler, 31% saying it is an enabler and 8% believe it is a major enabler. This is contrasted with 27% who believe their infrastructure is a barrier to innovation. Fifteen percent feel it is a slight barrier, 9% a barrier and 3% a major barrier. Two respondents suggested that while the infrastructure may support new technology, security concerns hamper its full use.

Comparing the scores of the exemplary institution with that of the others shows a substantial difference in the institutions ability to support new technology. The exemplary institutions' score was 4.0 out of 5 compared to the other institution's score of 3.13. A similar comparison can be made regarding the respondent's assessment of their infrastructure being an enabler or a barrier. The exemplary institution scored 3.38 compared to a score of 2.51 for the other institutions.

**Analysis of Infrastructure Section**

The survey data show that the respondents believe their infrastructure is an important part of the Innovation Migration Process, but there exists a perceived difference in capability. Twenty-four percent of the respondents rated their infrastructure as being less capable than average. This is a large percentage and indicative of a lack of support by the institution. The perception of a lack of support is reinforced by the comparison of scores between the exemplary institution and the other institutions. The

exemplary institutions' score was very high at 4.0, and while the other institutions' score was above the mean score of 2.5, it was almost a full integer below the exemplary institution. Similarly, the exemplary institutions' results regarding their infrastructure being an enabler or a barrier were well above the mean, while the other institutions' score was at the mean.

Ely includes infrastructure in his Eight Conditions for Implementation under resources. He says, "Resources are those things that are required to make implementation work … without them, implementation is reduced" (Surry & Ely, 2007, p. 108).

**Section3: People**

Questions 10, 11 and 12 asked for information about whether or not the leaders in the institution consider the respondent's opinions, ideas and beliefs when making decisions (question 10), if the level of shared decision making was adequate (question 11), and if the culture at the institution served as an enabler or a barrier to the Innovation Migration Process.

The highest percentage of respondents (44%) believe the leaders at their institution do take their suggestions and opinions into consideration with 31% rating it as above average and 13% rating it high. The second highest percentage rated their leadership as average with 35% and a smaller percentage rating it below average (9%) or low (8%). Two percent of the respondents were unsure or did not know.

Comparing the score of the exemplary institution with that of the others shows the majority of respondents believe their leaders do listen to them, with the exemplary

institution being somewhat higher. The exemplary institutions' score was 3.54 compared to 3.11 for the others.

Question 11 shows a drop in the percent of respondents who believe they have an adequate level of shared decision-making. Those who thought it was average was fairly consistent at 37%, with a drop in the percentage who feel it is more than adequate (26%) or much more than adequate (3%) when compared to question 10. The percentage of respondents who feel there is not enough shared decision-making almost doubled to 34% with 17% selecting a response of less than adequate and 9% feeling it is much less than adequate. There was a slight increase in those who were unsure or did not know at 5%.

The comparison between the exemplary institutions and the other institutions also shows a drop by both for shared decision-making, with the difference between the two closing. The exemplary institutions' average score was 2.92 compared with the score of the other institutions at 2.70.

Question 12 asked if the culture of the institution serves as an enabler or a barrier to the Innovation Migration Process. There was an upward shift in responses for this question with 49% stating their culture was more positive than neutral; 16% saying it is a slight enabler, 27% saying it is an enabler, and 6% believing their culture is a major enabler. Twenty-seven percent believe their culture is more negative than neutral with 17% saying it is a slight barrier, 9% saying it is a barrier and 1% believing it is a major barrier. Twenty-one percent of the respondents believe their culture is neither an enabler nor a barrier, and 3% chose not to answer the question.

Comparing the exemplary institutions with the others also showed a more positive response by the exemplary institutions with a score of 2.96 compared to 2.47 for the other institutions.

**Analysis of People Section**

The survey results for this section show that most of the respondents believe their leaders listen to them and accept their input. However, they do not believe they have a sufficient amount of influence in the decision-making process. This belief appears to be shared by the respondents from the exemplary institutions as well as those from the other institutions.

While questions 10 and 11 both had high average scores, there was a drop of one-half of an integer for both groups. This indicates the respondents would like to have a greater amount of influence in adopting, implementing and training for new instructional technology.

Ely calls this participation and describes it as, “shared decision making; communication among all parties involved in the process and, when direct participation is not possible, the implementers should feel that their ideas are represented through a surrogate” (Ely, 1999, p. 5). Ensminger agrees that the perspectives and support of the stakeholders must be present for technology integration to succeed (Ensminger, 2008).

**Section 4: Policy**

Questions 13 through 16 asked if the institution's written rules, traditions, practices and regulations that govern the Innovation Migration Process are fair, up-to-date and well known (question 13), flexible (question 14), appropriate (question 15) and whether they serve as an enabler or barrier.

The responses to question 13 were evenly split between above average (34%), average (36%) and below average (29%). Eight percent were unsure or did not know with two respondents providing additional information under the other response. One respondent stated they have no input into the policies and another saying they have no policies.

Comparing the exemplary institutions with the others shows a difference in how the respondents feel about their institutions policies. The exemplary institutions had an average score of 3.33, well above the mean score of 2.5 while the other institutions' score was close to the mean at 2.57.

Question 14 asked how easily the policies can be changed, and the data show the highest percent of respondents believe it to be average (41%) with the second highest percent (36%) responding their policies are somewhat rigid (24%) or extremely rigid (12%). Conversely, 16% believe their policies are somewhat easy to change (12%) or extremely easy to change (2%). Five percent are unsure or don't know and 3% selected the 'other' response with one saying they have policies but "they are not adhered to."

Comparing the scores of the exemplary institutions with that of the others shows the two scores are much closer than question 13. The exemplary institutions' average score was 2.63 compared with 2.53 of the other institutions.

The highest percentage of respondents (45%) believe their policies are adequate to support the Innovation Migration Process. The second highest percentage (28%) thought their policies are somewhat appropriate with 6% stating their policies are extremely appropriate. Conversely, 12% believe their policies are not appropriate and 4% feel they are extremely inappropriate. Four percent were unsure and 2% offered some elaboration, specifically that many of their policies are dictated by federal law.

A comparison of the exemplary institutions with the others shows respondents from the exemplary institutions believe their policies are more than adequate with a score of 3.63. The other institutions feel their policies are closer to the mean (adequate) with a score of 2.92.

The next question asked if the policies were an enabler or a barrier to the Innovation Migration Process. The highest percentage, (50%) believe they are a slight enabler (22%), an enabler (25%) or a major enabler (3%). This is contrasted with those who believe that their policies have a negative effect on the process (26%) with 18% stating they are a slight barrier, 6% a barrier and 2% are a major barrier.

Comparing the average score from the exemplary institutions with that of the other institutions shows most respondents believe their policies are more of an enabler than a barrier. The exemplary institutions' average score was 2.96 compared to 2.38 from the other institutions.

**Analysis of Policy Section**

The responses to the questions on policy were somewhat mixed and the data suggest many institution's policies are inadequate or non-existent. The data also

indicate that many of the policies that do exist are, in many cases, hard to change. These data conflict with the responses to question 13, where a majority of respondents believe their policies are adequate or more than adequate. This is further supported by the drop in the average scores for both the exemplary institution and the other institutions for questions 14 when compared to questions 13 and 15.

This suggests the institutions have adequate policies; that they serve as an enabler to the Innovation Migration Process, but when it is necessary to modify a policy to accommodate new technology, it is a somewhat difficult process.

**Section 6: Learning**

Questions 17 through 19 comprised the section on learning. These questions asked whether the institution's leaders consider the educational needs of the learner (question 17), the level of commitment to high quality instructional technology (question 18) and if the commitment of the leaderships acts as an enabler or a barrier to the Innovation Migration Process.

A relatively small percent (15%) of the respondents believe their leaders do not consider the educational needs of the learner, with 8% rating it below average and 7% as low. Thirty-five percent of the respondents believe it to be average and the highest percentage of respondents rated their leaders as above average (32%) or high (15%) when considering the needs of the learners.

Comparing the average score of the exemplary institution with that of the other institutions shows both groups believe their leaders consider the learner needs with the

exemplary institutions being slightly higher. The exemplary institutions scored 3.54 while the other institutions were scored at 3.33.

Question 18 asked how the respondent would rate their institution's commitment to provide high quality instructional technology in the learning environment. The majority of respondents believe there is a high level of commitment at the institution with 57% rating their institution with a strong commitment (36%) or a very strong commitment (21%). Fourteen percent felt their institution had a less than average level of commitment with 12% rated weak and 2% with a very weak commitment.

The average score for the exemplary institutions was 3.96 while the other institutions scored 3.51. The average score for question 18 was higher for both the exemplary institutions and the other institutions when compared to question 17.

The last question in the learning section asked the respondents to assess whether their institution's commitment to learner outcomes acts as an enabler or a barrier to the Innovation Migration Process. A majority responded positively with 71% rating their institution's commitment as a slight enabler (20%), an enabler (35%), or a major enabler (16%).

There was an even split between the those who felt their institution's commitment was neutral (14%), those who said it was a slight barrier (7%) and those believing it to be a barrier (7%). No respondents felt the commitment to the learners was a major barrier and one chose not to answer. However, one respondent offered a pessimistic view stating that learning outcomes were not used, but only served as a "check box for accreditation."

The difference between average scores between the exemplary institutions and the others remained about the same as question 18, but both scores dropped. The exemplary institution scored a 3.63 compared to the other institutions average score of 3.04.

**Analysis of Learning Section**

The survey data show a clear majority agree that their leaders are committed to the needs of the learners. This was born out in the results of each of the three questions, with a substantial majority indicating the level of commitment demonstrated by their leadership served as an enabler. While there was some disagreement on this point, it is significant that there were no responses indicating commitment was a major barrier for any institution.

Also noteworthy are the average scores of the two groups. The exemplary institutions continued to show a substantially higher average score than the other institutions. Additionally, the average scores for the two groups increased from question 17 to question 18, with the exemplary institutions' score having a greater gain. This suggests the respondents believe their leadership has a high commitment to providing a high quality of instructional technology but are less convinced their leadership considers the educational needs of their learners in the Innovation Migration Process.

The concept of commitment is one of Ely's Eight Conditions of Implementation and he explains it by saying, "This condition demonstrates firm and visible evidence that

there is endorsement and continuing support for implementation of the innovation" (Ely, 1999, p. 5). Ensminger agrees saying, "the visible actions of those in power position provide not only tangible resources, but also creditability to the integration efforts" (Ensminger, 2008, p. 335)

**Section 7: Evaluation**

The evaluation section of the survey asked two questions about the quality and quantity of assessment related to instructional technology, and whether the respondent believes evaluation acts as an enabler or barrier to the use of innovative practices in their learning environment.

Question 20 sought to determine the level of quality and quantity of evaluations related to instructional technology. The highest percentage (43%) believes these to be adequate. The second highest percentage of respondents believe these two traits are less than adequate (23%) or much less than adequate (6%). Seventeen percent of the respondents believe their evaluations to be more than adequate (12%) or much more than adequate (5%). Two respondents selected the 'other' response and stated that there is no formal evaluation process, or as one stated, "They don't exist." A higher percentage of respondents (8%) were unsure or did not know, and 2% chose not to answer.

A comparison of the exemplary institutions' average score with that of the other institutions shows a higher number of respondents from the other institutions believe the

quality and quantity of evaluations is more than adequate. The average score for the exemplary institutions was 2.38 while that of the other institutions was 2.62.

Question 21 asked the respondents to determine if the quantity and quality of evaluations act as an enabler or a barrier to the use of innovative instructional technology practices in their learning environment. Forty percent believe the evaluations conducted at their institution are neither an enabler or a barrier. Another 40% rated their assessments as a slight enabler (17%), an enabler (17%) or a major enabler (6%). Seventeen percent rated their institution's assessments as a slight barrier (11%), a barrier (5%) or a major barrier (1%). Three percent selected 'other' and described their evaluations as either non-existent, they exist but are done too early after implementation or the "evaluations are made but the results are not analyzed or used."

Comparing the average scores of the exemplary institutions with those of the others shows a reversal from those of questions 20. The exemplary institutions' average score was 2.58 and the other institutions score was a 2.34.

**Analysis of Evaluation Section**

The overall survey data for this section indicated the respondents feel there should be a higher level of assessments during the Innovation Migration Process. Question 20 sought to determine the level of quality and quantity of assessments and was the only question in the survey where the average score of the exemplary institutions was lower than the average of the other institutions. This combined with the 'other' responses reinforce the concept that the respondents would like to have more assessments during the process.

The data from question 21 indicate the respondents believe that assessments are an enabler, but they may not be done well. This was reflected by the low average scores of both the exemplary institutions and the other institutions. While the exemplary institutions' average score was higher than the other institutions, it was only slightly above the mean at 2.58. The other institutions average score fell below the mean at 2.34. Additionally, there was a higher percentage of respondents that were unsure or did not know, suggesting that assessments may not be done.

Multiple studies support the need for evaluation of, not only the technology, but the learner outcomes and the cultural changes that occur as a result of the innovation (Surry, 2002; Surry, Ensminger, & Haab, 2005)

**Section 8: Support**

The next five questions sought information on the level of support offered at the institutions. Support in this context had four components: training, technical support, pedagogical support and administrative leadership.

Question 22 asked the respondents to rate their institution's overall level of support to implement new instructional technology. The highest percentage of responses (38%) rated their institution as above average (26%) or high (12%). This was closely followed by a rating of average (36%) while 23% said their institution support was either below average (19%) or low (4%). Two percent were unsure or did not know and another 2% declined to answer.

The average scores of the exemplary institution and that of the other institutions were both well above the mean of 2.5. The exemplary institutions' score was 3.71 compared to that of the other institutions at 3.01.

Question 23 asked the respondents to rate their institution's level of support for all training, including formal and informal means of support related to implementing a new instructional technology. Most respondents (45%) believed the support offered at their institution was strong (29%) or very strong (16%). Twenty-seven percent felt their training support was average with an almost equal number (26%) rating their institution's training support as weak (20%) or very weak (6%). One respondent was unsure or didn't know and one chose not to answer.

The average scores of both the exemplary institutions and the others increased slightly while the difference between the two remained similar to that of question 22. The exemplary institutions' average score was 3.88 compared to the other's score of 3.11.

Question 24 asked about the level of technical support at their institution. Thirty-four percent believed it to be adequate, while 41% felt it was strong (27%) or very strong (14%). Twenty-one percent of the respondents felt the technical support was either weak (18%) or very weak (3%). One percent was unsure or didn't know and 2% chose not to answer. One respondent said the level of support at his institution was "nonexistent."

Both the exemplary and the other institutions average scores were substantially above the mean of 2.5. The exemplary institutions' score was 3.58 and the average score of the other institutions was 3.19.

The next question asked about the level of support provided to assist in innovative teaching approaches in the learning environment. The highest percentage (41%) of respondents felt it was average. The next highest percentage (33%) of respondents felt it was either a strong level of support (26%) or very strong (7%). Those who felt it was below average (20%) rated it as either weak (13%) or very weak (7%). Three percent were unsure or did not know, and one selected 'other' as the response, saying that none exists at the institution level.

Comparing the two groups, both were above the mean score of 2.5, but the difference was greater between the exemplary institutions and the other institutions from the previous question. The exemplary institutions' average score was 3.5 compared to the other institutions' score of 2.87.

Question 26 asked about the commitment the managers and supervisors have toward helping the respondent do an effective job. The highest percentage (53%) said it was either strong (40%) or very strong (12%), while 21% felt it was average. Twenty-two percent of the respondents felt it was less than average as either weak (15%) or very weak (7%). Two percent were unsure or did not know and three respondents chose not to answer.

A comparison of the average scores of the two groups shows they are both higher than the mean score and that the difference between the two scores closed somewhat. The exemplary institutions' score was 3.42 compared to the other institutions' score of 3.28.

**Analysis of Support Section**

Data from this section indicate the respondents believe they receive sufficient support in the areas of training, technical support, pedagogical support and administrative support. When asked to rate the overall level of support, the majority said it was average or above average.

The average score of both exemplary institutions and the other institutions were generally well above the mean with the exemplary institutions being the higher of the two. This suggests all the respondents consider support in the four areas important and feel their institutions provide an adequate level of support.

Several studies emphasize the importance of technical and pedagogical support in the Innovation Migration Process. It is one of Ely's Eight Conditions and studies by both Surry and Ensminger suggest that a lack of support will impede a successful implementation (Ely, 1990, 1999; Ensminger, et al., 2004; Surry, et al., 2005)

**Section 9: Strategic Planning**

Question 27 sought information on the specific role the respondent has in the strategic planning process. The highest percentage (28%) indicated they were a member of a decision-making team or committee. The next highest percentage were concerned individuals with little or no influence in the process at 23%, followed closely by members of a working group that makes recommendations to the decision-makers. Sixteen percent of the respondents stated they were not involved in the strategic planning process. A further 4% selected 'other' and most stated their input to the process would be considered if they choose to make it available.

Questions 28 and 29 asked the respondents to select the primary (question 28) and secondary (question 29) reason that prompts their institution to migrate to a new instructional technology. The intent of this question was to identify the factors that cause an institution to begin the process to replace the technology in their learning environment.

The highest percentage of respondents (28%) believed that a new technology better supports the learner outcomes. Twenty-one percent were unsure or did not know; with the next highest percent (13%) stating the current technology is outdated and no longer effective. Twelve percent said their institution is constantly looking for new technology. The next three reasons were close in the percentage of responses, with 8% saying the new technology was customizable to the needs of the institution, 7% felt faculty and/or student pressure was the primary reason, and 6% giving the lack of vendor support as their primary reason. The remaining responses were one and two percentages, with two percent choosing not to answer.

Four percent of the respondents selected ‘other’ and gave various reasons. One respondent said there are several different reasons but did not elaborate. One stated that, “I believe a small few like to choose the new technologies and don't seek campus-wide buy in.”

Where question 28 asked for the primary reason to begin the Innovation Migration Process, question 29 sought to identify the secondary reason. The highest percent of respondents (24%) were unsure or did not know. Of those who selected a secondary reason, the next highest (17%) felt it was due to the current technology being outdated and no longer effective. This was followed by the ability to customize the new

technology to the institution's needs (14%) and the new technology better supports the learner outcomes (13%). The remaining responses were evenly split with the exception of vendor demonstrations, which was not selected. One response from a service academy was that a new technology was directed by the military higher headquarters.

Question 30 was open-ended and provided the respondents an opportunity to elaborate on their selections, or provide additional information. Twenty-seven respondents did so, and their responses fell into three categories. First was improving effectiveness and responsiveness to student and faculty needs. Ten respondents felt this was important and was characterized by the following answer; we are "always seeking ways to be better teachers and leaders, giving our cadets the ability to retain knowledge better."

A second reason given was outside pressure to upgrade or change their technology. Five respondents felt this was an important consideration. A third reason was cost savings or cost avoidance with another five respondents believing this was a significant reason for moving to a new technology. One response combined cost and pressure by saying they needed to show improvements to be competitive for state funding. They have "self inflicted stress to maintain a place in the [state system] as a quality facility in order to improve funding."

The next three questions followed a similar pattern of asking the respondents to select the primary (question 31) and secondary (question 32) method their institution uses to identify new instructional technology. The highest percentage of respondents (33%) were unsure or did not know how their institution identified a new instructional technology. The method selected most often was a recommendation by faculty (20%)

followed by recommendations by technical support personnel (14%). Recommendations by a technical committee comprised of all stakeholders was next with 12%.

The next highest percentage (10%) selected 'other' and provided various methods of identifying new technology. These include recommendations from instructional designers, other institutions, the IT CIO, and unit directors. Research based best practices was another cited method, including literature and internet searches.

Question 32 asked for a secondary method of identifying new instructional technology, and again the highest percentage of respondents (36%) were unsure or did not know. Faculty recommendations was selected as the most common secondary method at 20%, followed by recommendations from technical support personnel with 14%. The next three secondary methods were all close with conferences and/or trade shows (7%), recommendations by vendors (6%) and recommendations by students/learners (5%).

Sixteen respondents answered question 33 which asked for a description of any other methods used to identify potential instructional technology. These included listserv discussions from similar institutions, surveys of stakeholders and other similar means. One respondent characterized it by saying, "our staff constantly exercises due diligence in scanning the marketplace, scanning IT/ID blogs, journals, talking with colleagues at other institutions and on cross-institutional committees and boards. Faculty often make direct recommendations after they have tried something on their own."

The next three questions sought information on the primary (question 34) and secondary (question 35) method used to adopt specific new technology for the learning environment. The purpose of these questions was to identify how an institution decides which instructional technology they will select.

The top three methods to selecting a new instructional technology were a decision made by an executive committee (21%), a unilateral decision made by an authority figure (14%) and a decision made by a technical working committee (12%). The largest percentage of respondents were unsure or did not know (31%) with the remaining responses distributed among the other answers. Two percent selected 'other' saying there were various methods used but were not specific.

Question 35 sought to determine secondary methods used to identify new instructional technology. Similarly to question 34, the highest percent were respondents who were unsure or did not know at 33%. The next three methods selected were also similar to question 34. Decisions made by executive steering committees were selected most frequently (17%) with decisions by technical working groups second (12%) followed by a unilateral decision by an authority figure (10%). Smaller percentages were distributed among the other responses with no coordinated decision-making process being selected by 8% and 6% saying their subordinate units can select their own technology but must go through an approval process.

Question 36 was an open-ended question asking respondents to describe any other methods used to select a new instructional technology. Eleven respondents did so with one saying they can select their own technology but it must be approved by a technical working group. Another said, "Within my budget constraints, I have the

authority to implement new technology for my department. I use input from faculty, student surveys and vendors. We implemented a product called Quizdom using this method for student quizzes and feedback response."

The next three questions continued this format, seeking to determine the primary (question 37) and secondary (question 38) methods to implement the new technology. Respondents seemed to be more comfortable identifying the primary method of implementing a new technology, that being a mandate for all units at the institution (26%). This was followed by the institution permitting subordinate units to manage the process (21%) and subordinate units can select their own instructional technology (16%). Twelve percent said their institution provides no guidance and 16% did not know or were unsure. Seven percent chose to offer a different reason and the responses were varied but similar to the offered selections. One person characterized their process by saying, "Performance issues are brought to a cadre of performance improvement professionals who conduct an appropriate analysis to determine how the performance problem is best overcome. This process includes a media and/or technology selection."

The next question asked for a secondary method used to implement new technology. The top three responses were the same as question 37 but the order shifted somewhat. Other than being unsure or don't know (26%), the highest percentage was permitting subordinate units to manage their own process (20%) followed by subordinate units selecting their instructional technology (17%). Ten percent said their institution provides no guidance on implementation allowing subordinate units to use it or not. Two percent of the respondents chose 'other' and

explained they use training methods to implement their technology. One person described this by saying, “training exposes faculty to new technologies and adoption best practices.”

There were eleven responses to the open-ended question asking for a description of other methods. Most of these responses were elaborations on the selections; however, several spoke of using peer pressure to ensure implementation. One person summarized this method by saying, we “encourage selection by peer pressure, using peer role models [and] provide assistance in classroom to ease transition.”

Questions 40 through 42 sought to identify the primary (question 40) and secondary (question 41) methods used to train the faculty on the new technology. The respondents were more knowledgeable regarding these methods with only 3% saying they were unsure or did not know. The highest percent of answers were optional training conducted by technical support (34%) followed by mandatory classes for all faculty (32%). The remaining selections were evenly split between vendor training purchased with the technology (8%) and self-directed training (12%). Five percent said training is not required with two offering other reasons. One respondent stated they have an instructional designer who offers “in-seat and on-line training and resources” while another said they have a “large-scale, scheduled, voluntary faculty development program and accompanying communications strategy.”

Self directed training (35%) was the highest response for secondary methods, followed by optional training conducted by technical support personnel (25%). Vendor training was the third most selected method with 9% and mandatory classes followed

with 6%. Ten percent of the respondents were unsure or did not know and 2% provided other methods of using job aids and on-the-job training.

There were thirteen responses to question 43, which asked for other methods to train faculty. These consisted of having a center for teaching excellence or a similar organization being responsible for faculty training. Others indicate training is done by peers through brown-bag lunches or a “train the trainer” session using expert faculty.

Questions 43 and 44 asked the respondents if their institution offered incentives (question 43) or rewards (question 44) for learning a new instructional technology. The difference between the two was explained by saying an incentive is a desirable condition or item offered in advance of the training, with a reward being received upon completion. The responses to both questions were very similar with the majority saying no to incentives (64%) and no to rewards (65%). The percent of respondents who were unsure were 19% for incentives and 17% for rewards.

Two percent of the respondents offered an explanation saying they have an annual award ceremony where faculty are recognized for their efforts. One respondent said they get “a free T-shirt” for completing training.

Question 45 asked the respondents to select a period of time typically needed to bring about new instructional technology. The highest percent of respondents were unsure or did not know (45%) with the next highest being one to two years (16%). Two to three years was next highest (12%) and 8% each for six months to a year and three to four years. Two percent offered other times saying generally it varies, but “important stuff can get adopted very quickly, others 1-2 years into mainstream.”

The next question asked the respondent's opinion on how effective the strategic planning process is at their institution. The highest percent said their process was effective but could use some improvements. More respondents believed their process was less than effective (27%) than those who believed their process was more than satisfactory (14%). Twenty percent selected slightly ineffective, needing many changes and 7% select extremely ineffective with the process usually leading to failure. Eleven percent believed their process was very effective and another 3% felt it was extremely effective and no changes were needed. Twenty-one percent were unsure or did not know.

Comparing the average score of the exemplary institutions with those of the others shows the exemplary institutions were slightly higher than the mean of 2.5 at 2.79. This was higher than the average score of the other institutions at 1.93.

Question 47 was an open-ended question that asked the respondent's opinion on the most effective strategies for adopting, implementing and training for a new instructional technology. Forty-one people responded and the majority of their answers were in four categories. The majority of the responses suggested the process should be tied to the vision and mission of the institution. This includes a tie to learning objectives and the budgeting process. Input from experts and faculty was the second most common response. Another category was a formalized process for training. This included small training groups as well as a centralized training organization. The fourth category was support from high-level administrators. Two people suggested it is important to apply theory and research to the process. One characterized this by saying, "Knowledge about the diffusion of innovations and change agency: Follow

Roger's general diffusion theory, use of Ely's implementation of ed. tech. strategy, and active use of Hall and Hord's change agency perspective in Concerns Based Adoption Model (CBAM). (Several members in our organization have specialties in one of these areas.)"

Question 48 asked for an opinion on the respondent's level of satisfaction with the strategic planning process at their institution. Nineteen percent were neither satisfied nor unsatisfied with an almost equal split between those who felt they were more than satisfied (28%) and those who were less than satisfied (29%).

Comparing the exemplary institutions with the other institutions shows the exemplary institutions' average score is above the mean at 2.92 while the average score of the other institutions fell below at 2.19.

The last question of the survey was an open-ended question that sought reasons for their satisfaction or dissatisfaction with the strategic planning process. There were forty-seven responses to this question, both positive and negative, but the negative responses were predominate. The positive responses fell into the following categories: having a disciplined process that works; having an opportunity to provide input and being a member of a "great team." The negative responses were categorized into the following headings: process takes too long, there is no apparent support for technology, no discipline to keep to a plan, lack of communication and faculty input, too many constraints including funding, top down decision making, and lack of institutional commitment.

**Analysis of Strategic Planning Section**

The purpose of the strategic planning section was to identify the factors that prompt an institution to begin the Innovation Migration Process, the method used to identify new instructional technology, the method used to implement the technology and how the faculty are trained on the effective use of the technology.

*Fit of the respondents*

The roles of the respondents in the strategic planning process were a representative cross section of decision-makers, members of a decision-making committee and members of a working group that make recommendations.

*Factors prompting the institution to begin the Innovation Migration Process*

The factor most often cited as the reason for beginning the Innovation Migration Process was a new technology that better supports the learner outcomes. The second reason was the current technology is outdated. Logically, these two reasons would go together, since when a technology becomes outdated, the institution would look for new technology that improves their ability to meet the learner's needs.

*Methods of identifying new instructional technology*

The highest percentage of respondents were unsure of the primary method of selecting a new instructional technology, however those that had a response mainly selected a process where recommendations were made to a decision authority. These were either faculty recommendations, recommendations by a technical committee comprised of all stakeholders, instructional designers, other institutions or the chief information officer. Getting recommendations from various sources held up as the

secondary method for selecting new instructional technology. This included recommendations by vendors.

*Methods of selecting new instructional technology*

The primary method of selecting a new instructional technology was a decision made by an executive committee. Two additional primary methods were suggested: a unilateral decision by an authority figure, and a decision made by a technical working group in that order.

Responses for the secondary method of selecting a new technology were similar to the primary method with using an executive steering committee having the highest percentage, but a decision by a technical working group was second with a unilateral decision ranking third. In both the primary and secondary method, the highest response rate was unsure or don't know. This suggests that most of the respondents are not involved in the selection process at their institution and may be indicative of the high level of dissatisfaction with the process.

*Methods of implementing new instructional technology*

The primary method of implementing a new technology was mandating it from the institution level. The other primary method was to permit a subordinate unit to manage the process. The secondary method of implementing a new technology was to allow the subordinate unit to manage the process. Several respondents tied implementation to training saying they implemented a new technology by training the faculty how to use it.

*Methods of training faculty on the new instructional technology*

There were several methods selected as the primary means of training faculty on new technology but the two most prevalent were optional training conducted by the institution's technical support personnel, and mandatory classes for all faculty. The secondary method selected was self-directed training.

## *Implementation of Interviews*

Once the exemplary programs were identified and arrangements were made to visit each site, the interviewing procedures suggested by Stake were followed. This involved getting permission to visit from the institution point of contact (Appendix K) and arranging access to the individuals identified to interview (Stake, 1995). A subsequent visitation schedule was established and the interviewees were notified. Copies of the informed consent form for an interview, and the interview protocol was emailed to each interviewee for his or her review and preparation.

The interview schedule was coordinated by the institution point of contact and the individual interviews lasted between 30 and 35 minutes. They were conducted in the interviewee's office or location of choice in order to ease the inconvenience to the interviewee as much as possible. Twelve individuals were interviewed and an effort was made to select a diverse group in terms of gender, age and role. Creswell states, "The idea behind qualitative research is to *purposefully* select participants or sites … that will best help the researcher understand the problem and the

| Gender of Interviewees | |
|---|---|
| Male | Female |
| 8 | 4 |

| Age of Interviewees | | | |
|---|---|---|---|
| 25-34 | 35-44 | 45-54 | 55 + |
| 3 | 3 | 3 | 3 |

| Role of Interviewee | | | | | |
|---|---|---|---|---|---|
| Exec Decision Maker | Manager | Full time Faculty | Tech Spt | Instruct Designer | Professional Staff |
| 5 | 2 | 6 | 2 | 2 | 2 |

Table 4.4

research question" (Creswell, 2003p. 185). Table 4.4 shows the demographic make-up of the individuals interviewed.

Seidman's advice was followed during the interviews. He urges caution when using an interview guide, believing that it may lead the researcher to gather questions to answers or corroborate opinions. He states in-depth interviewing "is designed to ask participants to reconstruct their experience and to explore their meaning" (Seidman, 2006, p. 76). He cautions that the questions that should be used in an in-depth interview are those that follow from what the participant said.

## *Interview Data Analysis*

The purpose of the interview was to gain an in-depth perspective of how the exemplary program negotiates the Innovation Migration Process according to experts at the institution. "Qualitative interviewing begins with the assumption that the perspective of others is meaningful, knowable, and able to be made explicit" (Patton, 2002, p. 341). Once the interviews were transcribed, a process called *memoing* began where observations and concepts were developed based on the responses of each interviewee to the questions (Emerson, Fretz, & Shaw, 1995, p. 155). Synthesizing data from the memos led to the development of themes for each interview. Focused coding of the themes for all twelve interviews followed which identified specific patterns in "what initially looks like a mass of confusing data" (Emerson, et al., 1995, p. 161). These patterns were developed into overarching themes that appear to be the basis of a successful program. Creswell offers a generic outline for case study analysis which was generally followed in this study (Creswell, 2003, p. 191).

In addition to providing data to select the exemplary program, questions from the RIPPLES(S) survey were used to triangulate the data gathered from the interviews. The following section describes these overarching themes in relation to the research questions.

## Overarching Themes

Using the data analysis method briefly described above, there were six overarching themes that emerged from the data. In no specific order, these are: 1) a culture of continuous improvement; 2) social factors, including robust communication; 3) underwriting failure; 4) leadership commitment; 5) focus on the mission; 6) time as a barrier. This section describes each of these themes.

*Culture of continuous improvement*

All twelve who were interviewed (names were changed to protect anonymity) commented that it is difficult to keep up with the rapid pace of technology, and while it is important to maintain a stable environment, it is equally important to keep abreast of new technology. Six of the twelve characterized this as continually trying to improve the teaching and learning environment, with culture playing a significant role; what Rogers calls innovativeness (Rogers, 2003, p. 22). Fred discussed this at length saying, "at [institution] we have a 'can-do' attitude that supports a spirit of innovation and it permeates the entire [institution] from the dean on down." Mike agreed by saying, "culture plays a very big part in our strategy to keep up with technology. There are always a few who don't want to change, but we have a lot of faculty who want to try new things. We know who they are and try to exploit their enthusiasm by getting them involved in the selection process." Bob explained it by saying, "we are always trying to find new ways to explain information and get it across to the student easier. How do I get it across to students so they understand it?" Several people pointed out that this theme of continuous improvement spans the entire process of adoption, implementation and training. George summed this up by saying, "we don't look at [the Innovation Migration Process] as discrete steps we need to check off, but as a system that builds in an upward spiral to make us more effective."

*Social factors and communication*

The importance of what Rogers calls the communications channel was resoundingly emphasized by the people interviewed (Rogers, 2003, p. 100). It became apparent that the interviewees placed as much importance on the social interaction as the formal hierarchical structure. Fred summarized this by saying, “I’ve taught at several institutions and the biggest difference here is the long tradition of working together. Departments work together and regularly invite people from other departments to meet new faculty and discuss ideas. This is incredibly important.” He went on to give an example of the social networking. “People know each other from other venues as well. I was at a soccer game and sat beside a professor from another department. It was very natural for us to begin discussing what we were doing and kick around ideas. We have a coffee call once a month where we get together. All this social interaction is incredibly important.”

*Underwriting failure*

One theme that emerged seemed to be almost taken for granted by the interviewees. This is the idea that the faculty are free to experiment with new instructional technology in their classroom. The critical difference is that the institution supports the efforts by providing the necessary resources. There were numerous examples given of this concept and Tom was very specific. “We go to great lengths to support our faculty when they want to try something new. It doesn’t matter if it is a single person or a department, we will provide the resources needed to give it a shot. If it works, then we try to generate interest on a wider scale. If it dies on the vine, that’s OK too because we learned something. The important thing is to encourage experimenting because you never know what will improve our program.” Sarah

broadened the scope somewhat by saying, “we are encouraged to try new things and it doesn’t have to be a new gadget. We can experiment with ideas and new approaches. Now that the Winter Olympics are here, I am trying to use some of the sports events as a new way to look at the lessons I am teaching. The leadership here is very supportive of this type of thing. Does it always work? No, but I learned something and can pass that on to others in the department.”

*Leadership commitment*

Nine of the twelve interviewees spoke about the importance of having the leadership at the institution committed to this process. While this is consistent with one of Ely's Eight Conditions for Implementation (Ely, 1990), the interviewees added a slight nuance. They suggested the commitment must be demonstrable and sincere. It is one thing to say "we need to begin using this new technology" but entirely another to see the leadership using it themselves. Sally emphasized the importance of seeing and hearing repeated examples of this commitment. She said, "We know the leadership is behind a new technology because we hear about it regularly at faculty meetings and training sessions. We see them using the new technology and they are very open about what they like and don't like about it." George agreed by saying, "Habituation from the highest level is very important. Not just saying this once, but constantly putting out the message. People focus on the things the boss checks and this keeps it on everyone's radar." Fred gave an example of this. "We had been looking at clicker technology for the classroom and bought a few sets to try out. The Dean was chairing a faculty meeting and we asked him if he wanted to use the clickers. He jumped on the idea and it worked incredibly well. This demonstrated the technology and showed a commitment by the leadership to try new things. It was a small thing, but a powerful example and something any institution can do."

*Focus on the mission*

A theme that all the interviewees described, albeit in different terms, was the focus on the mission of the institution. All those interviewed underscored the importance of understanding why everyone is at the institution. Whether they were in the classroom, directing the efforts from a position of leadership, or to a support role,

everyone spoke about the need to do their best to educate students. A casual look at this theme may miss the connection to the Innovation Migration Process. Fred explained this by saying, “We regularly get email listing cadets who leave the institution. This is very valuable because it makes us think about what we could do better to maybe keep that young man or woman here. After all, our job is to teach these young folks and prepare them for the future. That takes all the resources we have to do it right.” John emphasized the role technical support plays. “I may not be in the classroom, but I see the importance of making sure everything works there because a professor can’t waste class time trying to get a projector to work. We all have a role to play to be sure our students get the best education possible.”

*Time as a barrier*

The one theme that everyone agreed was a barrier to a successful innovation migration was time. George characterized it by saying, “Time is the coin of the realm. There is not a lot of white space in the schedule and we recognize that faculty development is very important. Sometimes the only time we can improve the faculty is during the lunch time which is when most faculty want to work out in the gym. Take to many lunch hours and they get disgruntled. Can’t do it during instruction time and they take a pretty hefty teaching load.” Sally feels a ‘top-down’ decision to adopt a new technology is very effective because it is a mandate and you are forced to get the training, but it is still hard to juggle priorities. “We stay too busy, and unless directed to attend a training session, it will probably get pushed to the side. I would like to have the time to learn more; to be more innovative in the classroom, but time is an issue.” Sarah

agrees that time is at a premium. “Someone would do a presentation and others would see it and want to use it, but they don’t have time to learn it. There are classes available but I don’t have time to go, so I am largely self-taught with some technology.”

Bob equates time with infrastructure, meaning that technology has to work when you need it. “I have a lot on my plate and don’t have the time to figure out things that are supposed to work. I don’t want to spend hours getting ready for a class and then take 50 minutes to get the technology in the classroom to work.” Other studies agree that time is a significant issue for higher education (Caffarella & Zinn, 1999; Ensminger, 2008; Feist, 2003).

## *Answering the research questions*

The following section answers the study’s research questions.

### *Research Question 1*

*What are the strategies used by post-secondary military institutions to adopt (select) new instructional technologies?*

Research question one sought to determine the strategies that lead to the successful adoption of new instructional technologies. Included in this question were the factors that prompt an institution to begin the Innovation Migration Process. The data showed quite definitively that for the exemplary institutions, this process is not ‘switched on and off’, but one that is constant. “We are always looking for new and innovative ways of teaching”, said Charles. “Sometimes it comes from dissatisfaction with what we have and other times it is because we see something new we want to try.” Terry agrees saying, “If the technology no longer meets the needs or there is an emerging technology that improves education, then we take a good look at it.” Similar comments came from the survey respondents with one saying, “[the] staff constantly

exercises due diligence in scanning the marketplace, scanning IT/ID blogs, journals, talking with colleagues at other institutions and on cross-institutional committees and boards. Faculty often make direct recommendations after they have tried something on their own."

Two main strategies for adopting new technology emerged from the interviews and they are situation specific. These are a top-down decision strategy and a bottom-up, grass roots effort.

*Top Down Decision Strategy*

This strategy is used when a campus-wide need is identified and the leadership believes a specific innovation will meet the need. Sarah described the advantages of this process by saying, “we are moving to [a course management system] and this was a ‘do or die’ top-down directive, while what we used to use was optional. Which is more effective? The top-down decision because you are forced to use it, and as long as you get the training you need, the process is very effective.” The survey data support this view with the highest percent of respondents saying a mandate at the institution level is the primary method for implementation. This is also supported by the results of the question that asked for the secondary reason for implementation where the highest percent were unsure of did not know of a secondary strategy. Thus, a strategy of making top down decisions is used when the need is one that affects the entire campus.

Cost is a big driver behind this strategy since there is always interest from the leadership when funds can be saved through economy of scale purchases. Configuration management also plays a role in this strategy by easing the technical support burden that comes with maintaining common items. John felt strongly about this and wanted to see more collaboration among support staff.

*Grass Roots Strategy*

The second strategy takes the opposite view – “grass roots”, or from the bottom up. Ideas for new learning technology come from one or two faculty who want to try it in their classrooms. The exemplary institutions look favorably on this and go to great lengths to support those efforts. Marvin described this strategy as “we are very supportive of ‘eaches’ meaning that if only one professor wants to try something, we

help them with what they need. If it takes off, great! If it dies on the vine, that's OK too. The important thing is giving it a chance." Mike took this strategy a step further by saying "we know where the pockets of excellence are and we exploit the heck out of them. When a professor comes to us with an idea, we jump on it and if it looks promising, we ask him to give a seminar on it."

The survey data did not explicitly support this strategy; however, they do support a secondary strategy of managing the implementation process at a department level (20%) or permitting subordinate units to select their own technology (17%). One respondent stated, "many faculty can make their own implementation decisions and provide their students support on their own."

Evan used the movie *Field of Dreams* as an analogy for these two strategies. He said, "In the movie, one of the characters kept saying 'if you build it, they will come'. That's the way we adopt some key technologies, the senior leaders decide to adopt a technology and we run with it. But, the reverse is also true; 'if they come, we will build it' meaning if someone wants to try something, we support it until we all agree it isn't working. Both strategies are important."

The interviewees almost unanimously agreed that faculty who wanted to try out new technology in their classroom needed the flexibility and centralized support to try it, even if it ultimately failed. Mike summed this up by saying, "We are very selective about which strategy we use, cost being a big issue, but normally we look for faculty that are doing something innovative and support them. We've had great success with this model with over 60 projects now being worked."

There is a cost consideration for this, however. Evan stated, “We are very supportive of faculty but have to also be selective if it becomes costly. We don’t like to do it, but sometimes we have to turn faculty away simply because of cost.” The survey respondents agreed with cost being an important consideration with 21% saying their funding was below average or low. One respondent remarked, “Funds set aside for entrepreneurial innovation are woefully small. Considering how much is said about risk taking, the institutional rules surrounding information technology severely hamper our ability to try new things. “

### ***Research Question 2***

*What strategies are used to implement the adopted technologies within their institutions?*

Research question 2 sought to determine the strategies that lead to the successful implementation of new instructional technologies.

This study found five strategies that support a successful implementation. These are: 1) Central Training Organization; 2) Leadership Commitment; 3) Tapping Expertise; 4) Support Organization; 5) Robust Infrastructure.

#### *Central Training Organization*

Having a dedicated group of people working toward implementing an innovation was very high on all the interviewee’s list. This organization serves two roles. First, it keeps the institution on top of new technology and passes on to the faculty information on what looks promising. Second, it keeps track of who is trying something new and arranges for that person to showcase their work. Mike described it this way. “We look at implementation and training as one function. If there is one person who is using a

new technology, then we bring her in to teach a faculty development class to others. We will advertise hot topics classes and this model lets faculty know they can come to us for help and support."

Several people discussed a program run by the central training organization which I will call the Master Teacher Program. This program takes two years to complete, is voluntary and provides technological and pedagogical training for faculty. It culminates with a capstone project that is presented to the cohort of students. The choice of project is largely left up to the student, but the requirement is such that it can become a viable innovation for use at the institution. Rob stated, "A very good way to implement new technology is through the master teacher program and the capstone project. I went through this program and learned a lot about teaching as well as technology. The end project is a paper that becomes part of the Center's curriculum on that technology. This is made available to everyone who wants to learn about the technology. People try things through the master teacher program. The director wants an assessment on everything so that is a big part of this process; to see if something new works."

The survey data indicated a level of frustration with a lack of guidance from their institution. Twelve percent of the respondents selected "Institution provides no guidance (you can use or not)" response when asked how an innovation is implemented. One respondent commented on using an innovation that, "There does not seem to be a plan. Individuals who like teaching online are just doing it."

*Leadership Commitment*

Discussed in the section on interview data analysis as one of the overarching themes, having senior leadership show a commitment to a new technology was important to the majority of those interviewed. George and Charles both felt strongly about this, believing that having the senior leadership constantly talk about a new technology, along with personally using it allows the faculty to see its importance and that it works. They believe this is very critical in a time-constrained environment. The survey data support this view with 57% of the survey respondents rating their leader commitment as strong (36%) or very strong (21%).

This concept also extends to the allocation of resources and policy guidance. Several of the people interviewed spoke about the Faculty Council and the important role it plays in the Innovation Migration Process. This council, which is chaired by a high-level administrator, meets each month. One subcommittee is responsible for identifying emerging technology and making recommendations to the council leadership. Once approval is given, guidance is developed to adopt and implement the technology and provided to the department heads. "This process is works very well," said George. Frank and Sarah agreed, describing the subcommittee being comprised of people who would be affected by any new technology being brought to the classroom. Sarah said, "The emerging technology subcommittee took a look at the Kindle electronic reader and decided not to go with it because the cadets are required to buy laptops and they could use those. The leadership is very supportive of this process."

According to Terry, another important factor in demonstrating leadership commitment is incorporating technology into the institution's strategic planning and mission statement.

*Tapping Expertise*

Another strategy for implementing technology thought to be effective by those interviewed is that of finding pockets of excellence and tapping into it. Five of the twelve interviewees said there are some people who don't want to change; what Sally described as "old souls who are content to continue as they have." However, there are always people who are eager to try new ideas and technology and become experts on it. The idea of tapping into this expertise lends the innovation a credibility that it would not otherwise have if it was pushed down from the top. Terry described this as, "getting opinion leaders involved early and using them to share their experiences." Mike says this is exploiting success and is a good model. "We focus on success models by finding successful instructors and getting them to teach others. This gives the technology a credibility that it wouldn't have if went around saying, 'you are going to love this'. [The opinion leaders] are very honest about what they struggle with and this makes them believable."

Several respondents to the survey agree, with one saying, "We encourage selection by peer pressure [and] using peer role models" to influence others. This is in a formal setting or during "brown bag lunches."

*Support Organization*

A key component of a successful implementation is having the technical support personnel organized efficiently. This is one area where the two exemplary institutions

differ. Both have a centralized technical support organization and both have technical support personnel decentralized at a lower lever to provide direct support. However, Institution D maintains close ties between the two groups where Institution F has no formal means to promote communication between the two groups.

Institution D holds weekly information meetings at the central organization and the lower level technical support personnel are required to attend at least 50% of the meetings. If their attendance drops, their supervisor is notified and asked to encourage them to attend more frequently. Tom believes this is a very efficient way to keep people apprised of new technology. John at Institution F laments the fact that he is kept in the dark about some things. He goes so far as to say, “If I leave or something happens to me, the [organization] is pretty much left in the dark because there is no one who can step in and make things happen. That happened to me when I arrived and [I] had to work hard to figure out what was what.” Sarah gave a good example of the importance of having good technical support. “I was getting ready to teach a class and had a problem with the equipment in the classroom. The tech support person was at the hospital but she was dedicated enough to call in on her Blackberry and work out the problem remotely. When something breaks, the technical support is there.”

The literature and the survey data agree on the importance of support, and 53% of the survey respondents said the level of commitment their managers and supervisor had towards helping them do an effective job was strong (40%) or very strong (13%). The responses to all the survey questions on support showed the majority of respondents believe their institution provides an above average level of support. Ely calls this commitment and suggests that those who are seen as supporting an

innovation have a greater amount of influence on the success than those who do not (Ely, 1990, 1999).

*Robust Infrastructure*

A key component of a successful implementation is having an infrastructure that will support the technology. Tom emphasized this by saying, “when you put a new technology in the classroom, it has to work. Not only that, but the underlying structure has to be in place as well. For example, if you want to show a video off YouTube, the bandwidth to support the video has to be there. And you can’t think in terms of one classroom, but every classroom on campus.” Charles agrees saying, “our support personnel are on top of things and keep our network running. It works and works all the time; we are very fortunate.”

The survey responses agreed that technical support is very important with 41% of the respondents saying their level of support was strong of very strong. One respondent said the level of support as his institution was “non-existent” and implied that it makes it very difficult to be effective in the classroom.

Multiple studies indicate that the infrastructure to support the innovation is critical and can directly influence the success or failure of an implementation (Ensminger, 2008; Ensminger, et al., 2004; Romero & Sorden, 2008; Surry & Ensminger, 2003; Surry, et al., 2005).

***Research Question 3***

*How are faculty trained to make use of the adopted instructional technology?*

Research question 3 sought to determine the strategies that lead to success in faculty development. This study found four strategies that support success in faculty development. These are: 1) Tapping expertise; 2) Awards, recognition and incentives; 3) Formal teaching program; and 4) Dedicated training time.

*Tapping expertise*

This concept is the same as described in research question 2 and is included here because those interviewed see this as a critical part of both implementation and training.

*Awards, Recognition and Incentives*

This is the second dichotomy between the two exemplary institutions. Institution F provides an incentive to faculty for undertaking an extensive training program. Faculty who sign up for a series of seminars and workshops totaling 14 hours receive a computer of their choice upon completion. Institution D has no such program and in fact relys a great amount on mandatory training for faculty. Both institutions have awards and recognition that are considered prestigious and very similar in nature. George describes this as, “We have an annual award called [award] that is given for innovation in teaching. It is considered a high honor and has [institution] wide recognition. Evan described the award at Institution F in a similar manner. “Our big recognition for faculty is called [award] and is for innovation in teaching. It is amazing what some faculty are doing with technology in the classroom. This award is a pretty big deal at [institution].”

The survey data show that the incentive program at Institution F is the exception rather than the rule. For both incentives and rewards, more than 75% of the respondents said they have no such program at their institution. Further, more than 15% said they were unsure or did not know if a program existed, suggesting it is unlikely they have one. One respondent said, “it depends; sometimes a department will push its faculty to get on board” meaning the use of a negative incentive.

*Formal teaching program*

A formal teaching program is considered a very important part of faculty development at the exemplary institutions. It is a voluntary program and there is a great amount of flexibility on what a faculty member wants to learn. The course schedule is also flexible allowing the faculty member to take the classes at a convenient time. As described above, the Master Teacher Program culminates with a capstone project that allows the faculty member to gain in-depth knowledge about a topic of interest. This effort in turn, helps the institution disseminate the knowledge to other faculty members who might have an interest.

The survey data show most institutions recognize the importance of some type of faculty training. Respondents selecting the “Training is not required” answer to the questions was low with less than 4%, and 3% saying they were unsure or did not know. The type of faculty training offered at the institutions generally involved mandated classes as the primary method, but optional training by technical support personnel was also listed as a secondary method. Other methods were also offered with several respondents listing “brown bag lunch” discussions.

Faculty development is a rich subject in the literature, and the methods are almost as diverse as the number of articles. This includes both support for and against mandatory faculty development. Most believe that requiring faculty to attend training sessions would be unsuccessful because it goes against the autonomy and freedom enjoyed by the faculty (Knowles, Holton, & Swanson, 1998). However, some researchers believe mandatory faculty development can be successful (Kreaden, 2001).

*Dedicated training time*

As noted above, the majority of those interviewed spoke about the pressures of time and maintaining a hectic schedule. Providing a dedicated time for faculty training is the third area where the two exemplary institutions diverge on philosophy. Both see the importance of having a defined time for training; where they differ is in when and how they do this. Institution D devotes a week at the beginning of each academic period for training and "the academic semester begins with day one of the faculty training period" says George. He goes on to say, "This training is mandatory and all faculty know they are to keep their calendar clear during this time so nothing interferes with attending seminars." Some of these seminars are conducted by faculty themselves and others are held by the center responsible for training. This time is when new technology is introduced and faculty have a chance to work with it.

Institution F offers training seminars through a central training organization and the program is voluntary. As noted above, the strategy is to use incentives to get faculty to take the training rather than make it mandatory. There is no set schedule for the training; it is offered multiple times throughout the semester with a schedule going out before the end of the previous academic term.

The survey data indicate there seems to be time for training, but the individual must decide to take advantage of it. One respondent said, “We talk about setting aside the time, but it comes at a cost to other initiatives or the individuals own schedule, because concurrent responsibilities are not reduced.”

In short, where one exemplary institution sets aside a mandatory training period at the beginning of each semester, the other spreads voluntary faculty training sessions throughout the academic term. Both strategies seem to be effective, and both are supported by the literature (Knowles, et al., 1998; Kreaden, 2001).

## *Findings for research questions*

The overarching themes that exist within the exemplary institutions align very closely with the research done by Rogers and Ely. What Fred calls a “can-do” spirit and the importance he and others place on social factors, Rogers describes as “innovativeness ... the bottom-line behavior in the diffusion process” and communication channels (Rogers, 2003, p. 268, 5). The importance Ely places on leadership commitment and participation (Ely, 1990, 1999) is echoed by George and Charles when they describe the need for the senior leadership to demonstrate their knowledge and use of a technology. The focus on the mission and the attitude of “it’s OK to fail” also support the concept of innovativeness. The specific strategies used by the exemplary institution flow from the overarching themes.

## *Summary of the findings*

The demographics of the survey respondents were representative the population in terms of gender, age and role at the institution. Scoring the 121 surveys by assigning point values to answers revealed that two institutions were in a virtual tie for selection as the case study. They both served as exemplary institutions and were compared against the other institutions.

Interviews were scheduled for Phase II of the study using volunteers from the two exemplary institutions. They consisted of eight males and four females who were evenly split in the four age groups. The roles of the interviewees at their institution were: five decision makers, two managers, six faculty, two technical support, two instructional designers and two professional staff.

The military institutions studied use two main strategies for adopting new instructional technology. The first is a top-down approach, where the institution's leadership directs that a new technology will be implemented. This occurs when the innovation will be used across the institution and all faculty are expected to use it. The second is a bottom-up strategy where new technology is identified by an individual or small group of faculty and they wish to try it in their classroom. In both cases, the technical support organization at the institution must be willing and available to support the method.

Five strategies emerged for implementing the selected instructional technology. These were all considered important by both the survey respondents and those interviewed. They are: centralized training; a strong commitment demonstrated by the institutional leadership; identifying and capitalizing on the expertise developed by the

faculty; having well defined support for pedagogy and technical issues; and an infrastructure that will adequately support the technology.

The study found four strategies used by the institutions for faculty development. The first, tapping expertise was also a strategy used in implementation and this reflects the largely held view that implementation and training are intertwined. While the literature suggests rewards and incentives are important, the study found these are not widely used at the military institutions. One exemplary institution used incentives, however even this program was voluntary. One survey respondent suggested his institution uses a negative incentive for not completing the training.

Formal instruction was the most common method of faculty development for the exemplary institutions, with one setting aside dedicated time at the beginning of each academic period and the other having training classes scheduled throughout the year. Neither the survey respondents nor those interviewed appeared to take exception with either method.

The fourth strategy identified for faculty development was setting aside dedicated time for training. The literature agrees that having time for training is important and as one survey respondent said, “time is the most important resource, and it is usually scarce.”

These strategies for adoption, implementation and faculty training are discussed and supported by Rogers’ work on Diffusion of Innovation, Ely’s Eight Conditions of Implementation and Surry and Ensminger’s research.

# Chapter 5 – Conclusions and Suggested Guidelines

## *Introduction to the chapter*

The purpose of this study was to identify the strategies and methods used by post-secondary military institutions to adopt, implement and train faculty on new instructional technology for their learning environment. Using a phased approach and a mixed methods design, the study surveyed nineteen military institutions to: 1) gain insight on the Innovation Migration Process, and 2) identify an exemplary institution to serve as a case study.

Analysis of the survey data and the follow-up interviews allowed the researcher to draw conclusions and offer guidelines to military institutions of higher education. The format for this chapter is: 1) discussion of the results, 2) relationship of the findings to the literature, 3) suggested guidelines for post-secondary military institutions and 4) summary.

## *Discussion of the results.*

The framework for this study was the seminal work on diffusion of innovation theory by Everett M. Rogers, the Eight Conditions for Implementation developed by Donald P. Ely and the research on implementation of instructional technology done primarily by Daniel W. Surry and David C. Ensminger. The three parts of this framework (adoption, implementation and training) are called the Innovation Migration Process. Seeking to understand how military institutions of higher education successfully adopt, implement and train faculty for new instructional technology in their learning

environment, three research questions emerged: 1) what are the strategies used by post-secondary military institutions to adopt (select) new instructional technologies? 2) what strategies are used to implement the adopted technologies within their institutions? 3) how are faculty trained to make use of the adopted instructional technology?

*Strategies for Adoption*

There were clearly two strategies used by the exemplary institutions to adopt new instructional technology, and they represent the opposite ends of the spectrum. In cases where an innovation will have institution wide use, a top-down decision is made and all personnel are required to learn to use it. The survey data and interviews pointed to cases where this occurs, and there did not seem to be any issues in doing this. Indeed, in the case of a new content management system being implemented at one of the two exemplary institutions, most of the survey respondents and those who were interviewed seemed to be very comfortable with the change. Two factors appear to facilitate this attitude; the amount of time given to make the change and a very robust support system to ease the transition.

In other cases where the use of an innovation may not be wide spread at the institution, a “grass roots” strategy is used. This gives faculty the flexibility to experiment in their classrooms, to try new technologies and see what works. As one interviewee commented, the faculty are free to try out something new and if it works, that is fine, and if it doesn’t work, that is also fine. This flexibility and attitude of continually trying to improve is indicative of a culture of innovativeness. When the fear of repercussions for failure is removed, indeed, knowing the institution is supportive;

many of the faculty will try new methods of teaching. This can lead to a cycle of continuous process improvement in the learning environment.

*Strategies for Implementation*

The study found five strategies that support a successful implementation, three of which require the institution to financially invest in the process, one is philosophical in nature and the last is a process. The first three are: providing for a central training organization, having an adequate technical support organization and ensuring the infrastructure is adequate to meet the demands placed on it. These are long-term, on-going investments in people and technology that take time to structure and develop, and must be in place for the faculty to believe they can safely experiment with new teaching techniques. The need for a robust infrastructure to support new technology is obvious. A faculty member does not wish to waste his or her time developing a course if the classroom will not support the necessary technology. Equally obvious is the need for skilled support personnel who can maintain the capability and look for emerging technology to improve their infrastructure.

A centralized training organization is also a long-term investment but has a number of advantages. First, it keeps the faculty current with new technology and trends. Second, it becomes a repository of knowledge about various technologies and can be a resource for faculty to use when they have questions or wish to pursue an innovation. Third, the training organization can offer seminars and short courses throughout the year which will reduce the amount of time required of a faculty member

to get the training on his or her own. Fourth, the organization can help develop and maintain policies for use of technology.

Additionally, this organization can seek out the innovators among the faculty to evaluate new technology and serve as opinion leaders. This will help diffuse the innovation across the institution.

The philosophical strategy of leadership commitment is important and cannot be overestimated. This strategy requires little in terms of a financial outlay, but does necessitate an investment in time from the leaders who have a busy schedule. The fact that there are great time demands placed on the institution's leadership lends credibility and weight to the innovation when others see a commitment on the part of their leadership. Another aspect of leadership commitment is a belief by those who will be using the innovation that it will be a successful implementation simply because "the boss is watching." Implied with this strategy is the notion that there are adequate policies and regulations that govern the Innovation Migration Process. This study found that, while many respondents believe their policies are adequate, most felt they were too rigid and took too much effort to change. It is the responsibility of the leadership to have an effective role in the formation and modification of policies.

The last strategy identified for implementing a new instructional technology is making use of the expertise of faculty who decided to try something new. Both of the exemplary institutions called this "tapping expertise" and they described it as finding someone who is innovative and wants to be on the "cutting edge" of technology. These faculty serve as innovators and opinion leaders; someone who will try out the innovation and then describe its merits to others (Rogers, 2003, p. 316). This strategy is very

effective since the other faculty recognize the faculty expert is under no obligation to endorse a product or service. It also has the advantage of multiplying the effectiveness of the centralized training organization by using outside expertise to experiment and make recommendations for adoption.

The study found four strategies that support a successful faculty development program. One of these is a strategy for implementation mentioned above; tapping expertise, which this shows how closely linked implementation and training are considered by the institutions. The other strategies are: awards, recognitions, and incentives, a formal training program and dedicated training time.

The study found that most of the institutions do not offer rewards or incentives to faculty for training; indeed one survey respondent said they were given a T-shirt upon completion of training. Of the two exemplary institutions, one had an incentive program while the other mandated training and it appears both have effective faculty training programs. However, many institutions do recognize excellence in teaching with a prestigious award which can be a motivator to some.

The survey data, as well as the interview data found that most institutions have a formal teaching program for their faculty. The exemplary institutions both had some variation of a formal teaching program that allowed a great amount of flexibility for faculty development. These programs have the advantage of shaping the faculty development by how the program is structured as well as giving the faculty a wide range of courses from which to choose. For example, one of the exemplary institutions offers over a dozen “tracks” each spring where faculty can select an area to enhance their

knowledge. This program is associated with an incentive where the faculty member receives a computer of his or her choice when they complete the program.

The last strategy identified for faculty development is the provision of dedicated training time. As many survey respondents and several interviewees implied, time is a faculty member's most precious resource. For example, one survey respondent said, "for us, time is the most important resource, and it is scarce." Requiring a faculty member to learn a new technology on his or her own time increases the probability that it will not happen (Ebersole & Vorndam, 2003; Pajo & Wallace, 2001). Both the exemplary institutions recognized the importance of having time for faculty training, but each did it differently. One sets aside a week at the beginning of each academic period for concentrated faculty development. This time was used for formal and informal training, as well as scheduled time for faculty to showcase their own classroom innovations. The other exemplary institution schedules faculty training throughout the academic year and uses the incentive of the computer to attract faculty/students. This method seems to be effective due to the number and variety of courses offered. It does require a significant investment in resources that are committed to training. The mandatory, one-week model, while limited in duration may reduce the cost associated with training.

One factor that emerged from the data that supports the findings of all three research questions is what one interviewee called the institution's "can-do" attitude. This spirit of innovation is difficult to develop in an organization, but can be an overriding factor in bringing a new instructional technology to the learning environment. When those involved in the Innovation Migration Process are optimistic, supportive, and

committed, the chances of a successful implementation are increased (Rogers, 2003, p.174).

## *Relationship of the findings to the literature*

The field of diffusion theory has long been dominated by Everett M. Rogers and the findings of this study support his research. Rogers discovered four key elements that are always present in the Innovation Migration process. These are innovation, communication, time, and a developed social system (Rogers, 2003, p. 11). Each of these elements was found in this study, with a particular emphasis on the developed social system. As part of the social system, Rogers believes the common goals of the organization drive the dissemination of knowledge, but the decision to adopt is made in one of three ways: a decision is made by individuals without the help of others, a collective decision made by a majority of participants or an authority decision by someone in an authority position. This study found the prevalent methods of adoption are the top-down authority decision and the grass roots, bottom-up strategy, both of which are consistent with Rogers' research (Rogers, 2003, p. 22, 29).

Ely's Eight Conditions for Implementation align with the findings of this study with one exception. The study found that resources, both time and funding are important to a successful implementation. This includes adequate "on the clock" time that must be available for faculty development. The study also found there must be a high level of participation or shared decision-making and the leadership must demonstrate a commitment to the process. These factors are all addressed in Ely's Eight Conditions of Implementation and numerous other studies show the presence of these conditions are highly correlated to a successful implementation (Ely, 1990; Ensminger, et al., 2004;

Klein & Sorra, 1996; Kotter, 1996; Pajo & Wallace, 2001; Surry & Ely, 2007; Zhou & Xu, 2007).

The exception found in this study is the lack of rewards and incentives offered at the institutions. Sixty four percent of the institutions surveyed said there were no incentives offered for training, with another 19% saying they did not know or were unsure. Only 13% were sure incentives were offered for participating in training. The percentages were almost identical for rewards with 12% saying a reward was offered and 82% saying none was offered or were not sure. Ely believes the opportunity for a reward or incentive will increase the chances of success (Ely, 1990). Rogers agrees saying, "the main function of an incentive for adopters is to increase the degree of relative advantage of the new idea" (Rogers, 2003, p. 236). However, the lack of incentives and rewards may be mitigated by what Rogers calls a culture of innovativeness and what the interviewees say is a "can-do" spirit that is willing to overcome challenges (Rogers, 2003, p. 22)

## *Suggested Guidelines for post-secondary military institutions*

While there is no formula that guarantees success in bringing new instructional technology into the learning environment (Surry & Ely, 2007), the findings from this study may serve as a set of suggested guidelines that post-secondary military institutions can use when faced with this challenge. These guidelines are divided into two categories, philosophical and practical and are supported by the literature. The philosophical guidelines are those that require little or no financial resources, but have an impact on the attitude and morale within the institution. Practical guidelines are concrete suggestions based on the literature and the findings of this study. The

following guidelines were drawn from the survey and interview data, as well as the relevant literature.

*Suggested Philosophical Guidelines*

1. Create a culture of innovativeness.

Institutions of higher education face many of the same challenges that confront business and industry. We are in an era of accelerating technological change where capabilities not thought possible just a few years ago are becoming the norm in today's society. Coping with this constant change requires an organizational culture that embraces new ideas and technology; one that is not change adverse, but overcomes challenges through persistence and an attitude of "we can make this happen." This is what Rogers calls innovativeness which he describes as the level of organizational readiness to adopt an innovation (Rogers, 2003, p. 22). It is perhaps the most difficult of the suggested guidelines to accomplish because developing a culture of innovativeness takes time and a concerted effort. It can also be a force multiplier for the organization because where one organization without this collective attitude would give up, another with a positive spirit will find a way to make a new technology work for them. Ely's Eight Conditions for Implementation can serve as a basis for developing this culture (Surry & Ely, 2007).

2. Leader commitment.

Another philosophical guideline that supports developing this culture of innovativeness is a demonstrated commitment by the senior leadership at the institution. The commitment must be visible, persistent, sincere, and to the

extent possible, enthusiastic. It includes the formulation and enforcement of reasonable policies and procedures that govern the process. This is one of Ely's Eight Conditions for Implementation and a simple verbal endorsement of the innovation by leaders is not sufficient to convince the faculty the implementation will succeed (Buchan & Swann, 2007). A high level of commitment assures the faculty that the institution will do what is necessary to succeed at the Innovation Migration Process.

*Suggested Practical Guidelines*

1. Follow Ely's Eight Conditions for Implementation.

This study joins several others in establishing the importance of Ely's Eight Conditions of Implementation (Ensminger, 2008; Ensminger & Surry, 2008; Ensminger, et al., 2004; Surry & Ely, 2007). While the literature suggests the relative ranking of the conditions will change depending on the organization and the type of technology, and a "one size fits all approach to implementation planning is limited" (Ensminger & Surry, 2008, p. 623) there is agreement that considering these conditions when implementing a new technology is critical (Surry & Ensminger, 2003). These conditions can serve as a baseline to conduct an implementation analysis where each condition is defined for the intended innovation and an assessment made on its relative importance (Surry & Ely, 2007).

2. Create a centralized training organization.

There are several advantages inherent in a centralized training organization. 1) It has dedicated training experts who can keep up-to-date with technology and

selectively present opportunities for faculty training based on their knowledge of faculty needs. 2) It is a place for faculty to go when they have questions about how to best use specific technology. 3) It can serve as a focal point for developing policies and procedures for the process. 4) Equally important, this organization can seek out the innovators among the faculty who can support the implementation process as early adopters and opinion leaders.

3. Develop a robust technical support organization

A technical support organization must assume responsibility for several important parts of the Innovation Migration Process. First, it must maintain the infrastructure so the faculty can experiment and fully use the new instructional technology. Second, it can establish procedures to quickly and efficiently resolve technical problems in the learning environment. This reduces faculty frustration when they have a presentation and rely on the technology to work. Third, this organization can serve as a backup for the technical support personnel in subordinate units as well as provide training sessions; what Rogers calls a communications channel to disseminate information among all the technical staff (Rogers, 2003, p. 18).

4. Well developed infrastructure

Infrastructure includes the hardware, software and equipment required for internet connectivity and a learning environment without an adequate infrastructure is like a new car with no gas… it will not go anywhere. Faculty take it for granted that the equipment is going to work when they want to use it, and if it does not, their level of frustration rises. As Tom pointed out, “when you put a new technology in the classroom, it has to work. Not only that, but the underlying structure has to be in

place as well. For example, if you want to show a video off YouTube, the bandwidth to support the video has to be there. And you can't think in terms of one classroom, but every classroom on campus."

Developing a robust infrastructure is an investment in time and money and is a tangible demonstration of the leadership's commitment to providing faculty with the tools they need. The literature has numerous studies that highlight the importance of maintaining a robust infrastructure (Ensminger, 2008; Ensminger, et al., 2004; Romero & Sorden, 2008; Surry & Ensminger, 2003; Surry, et al., 2005).

5. Seek out and support innovators

There are people in every organization who want to be on the cutting edge of innovation. Rogers calls them innovators and says, "the salient value of the innovator is venturesomeness, due to a desire for the rash, the daring, and the risky" (Rogers, 2003, p. 282). Rather than inhibit these individuals, the institution should encourage them to experiment with new ideas and technology and share their findings with others. The central training organization can manage this process and help guide it to areas thought to be fruitful.

6. Formal faculty development program

Virtually all institutions recognize the need for some type of faculty development program (Cook & Marincovich, 2009; Rouseff-Baker, 2002; Schonwetter & Nazarko, 2008, 2009). The study found two methods used to train the faculty: 1) a mandatory training period set aside at the beginning of each academic period, and 2) scheduled training done throughout the academic year with an incentive for faculty to participate. Both methods are ingrained in their respective institution's culture and

used effectively; the important aspect is the faculty have a set of formal procedures they can follow to increase their effectiveness in the learning environment.

A faculty development program implies there is dedicated time allocated for this training, what Ely calls “company time, not just personal time at home” (Ely, 1990, 1999). Inadequate time to learn new technology is a barrier to successful implementation (Ebersole & Vorndam, 2003; Pajo & Wallace, 2001).

### *Summary.*

In summary, the intent of this research was to identify the strategies and methods used by post-secondary military institutions to adopt, implement and train faculty on new instructional technology for their learning environment. The research was based on the diffusion of innovation work of Rogers, Ely’s Eight Conditions for Implementation, and primarily the research of Surry and Ensminger, among others. The findings were consistent with previous studies of this nature and supported by Surry and Ely’s belief that the conditions for implementation will change depending on organizational culture and the type of innovation being implemented (Surry & Ely, 2007).

The study found that the military institutions adopt new technology using both a top-down and a bottom-up approach, depending on the technology being implemented and the intended use. The strategies for implementation overlapped somewhat with the training strategies, but consisted of identifying expert faculty members to serve as opinion leaders, using centralized training programs, have a committed institutional leadership, having well defined support in place for pedagogical and technical issues, and a building a robust infrastructure that will support the innovation. The study found four strategies that support faculty development. These are, identifying faculty experts

to “lead the way,” formal instruction held at some point during the academic year, setting aside dedicated time for training and using some type of recognition. While rewards and incentives are one of Ely’s Eight Conditions for Implementation, the study found these were not widely used, but prestigious awards were however.

# Bibliography

# Appendix A

## *IRB Approval*

VirginiaTech

**Office of Research Compliance**
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FWA00000572 (expires 6/13/2011)
IRB # is IRB00000667

DATE: February 4, 2010

MEMORANDUM

TO: William D Miller

Approval date: 2/4/2010
Continuing Review Due Date:1/20/2011
Expiration Date: 2/3/2011

FROM: David M. Moore

SUBJECT: **IRB Expedited Approval:** "Innovation Migration Process Descriptive Study" , IRB # 10-094

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 February 4, 2010.

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 application.

cc: File

# Appendix B

## *Permission to use RIPPLES survey*

-----Original Message-----
From: Daniel Surry [mailto:DSurry@usouthal.edu]
Sent: Wednesday, November 11, 2009 4:26 PM
To: Miller, COL Dave
Cc: Daniel Surry
Subject: Re: Request for permission to use the RIPPLES model survey

Dave:

Thanks for your phone call. I enjoyed talking to you.

There is a generic version of the RIPPLES survey available online at:

http://www.surveymonkey.com/s.aspx?sm=VxFbVt7cg1NiBboxTrbG4w_3d_3d

You have my permission to use the survey, modify it as you need, and otherwise use it for any purpose related to your dissertation research.

If you need any help or want to talk about it some more, please let me know.

Attached to this email, I have attached several papers related to the RIPPLES model which may be of interest to you.

Good luck with your research, it sounds very interesting.

Dan

**********
Dan Surry
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>>> "Miller, COL Dave" <***dmiller3@vt.edu***> 11/11/09 3:06 PM >>>
Dr. Surry,

It was a pleasure to speak with you on the phone, and I appreciate your offer to send some studies on what I call the Innovation Migration Process.

If you would be so kind as to give permission, I would like to use your RIPPLES survey as the basis for Phase I of my research into learning how leader development programs migrate to new technology.

With warm regards,

Dave

Dave Miller
Colonel, USA (ret)
Deputy Commandant for Leader Development Virginia Tech Corps of Cadets
Director, Rice Center for Leader Development
143 Brodie Hall (0213)
Blacksburg, VA 24061
540.231.9455

Thought of the Day...

"To educate a person in mind and not in morals is to educate a menace to society."
Teddy Roosevelt

*Appendix C*

# RIPPLES(S) SURVEY INSTRUMENT

## Instructions:

I am conducting a study to determine the factors that enable or impede leader development programs to adopt, implement and train faculty on new instructional technology.

Adoption is defined as the decision to make full use of an innovation as the best course of action available by an individual or organization, i.e., selecting a new technology to use

Implementation is defined as taking a new instructional technology beyond a project stage and embedding it as a "routine practice." New instructional technology includes hardware, software, and teaching practices in your learning environment, including traditional (classroom) and non-traditional (online) modes of teaching.

Training is defined as developing the skills necessary for faculty to comfortably use the instructional technology (innovation) in an educational environment.

My goal is to identify the key factors that make an organization "innovation ready and innovation friendly." The results of this study will inform decision makers about models, considerations and potential impacts of embedding innovative practices.
The questionnaire has XX questions and will take approximately TT minutes to complete. The questions relate to factors that you believe are important in implementing new instructional technology and your responses are completely anonymous. No information that can be used to identify you will be made. However, phase II of the study will be interviews of personnel at a specific institution the survey identifies as having success in new technology adoption, implementation and training which necessitates identifying institutions. You will be given an opportunity to leave an email address if you would like to be considered for an interview. If you choose not to be contacted, leave the questions at the end of the survey blank.

If you have questions or comments about this questionnaire or the study in general, please contact: Dave Miller at dmiller3@vt.edu

Thank you for participating in this study.

*Table 1*

What is your gender?

| | Frequency | Percent |
|---|---|---|
| Male | 77 | 64% |
| Female | 38 | 31% |
| Prefer not to answer | 5 | 4% |
| No Answer | 1 | 1% |

*Table 2*

What is your age?

| | Frequency | Percent |
|---|---|---|
| Less than 25 | 77 | 64% |
| 35 to 44 | 32 | 26% |
| 45 to 54 | 37 | 31% |
| 55 or more | 34 | 28% |
| Prefer not to answer | 6 | 5% |
| No Answer | 0 | 0% |

*Table 3*

*What role(s) do you have at your institution?*

| | Frequency | Percent |
|---|---|---|
| Executive - Decision Maker | 22 | 18% |
| Manager | 26 | 21% |
| Full- time teaching faculty | 48 | 40% |
| Full-time research faculty | 2 | 2% |
| Adjunct faculty | 13 | 11% |
| Graduate teaching asst | 0 | 0% |
| Technical support | 10 | 8% |
| Instructional designer | 12 | 10% |
| Professional staff | 16 | 13% |
| Other | 14 | 12% |

*Table 4*

How would you rate the level of financial resources available for adopting (selecting), implementing and training faculty to use an innovation in the learning environment?

| | Frequency | Percent | Value |
|---|---|---|---|
| High | 10 | 8% | 5 |
| Above average | 31 | 26 | 4 |
| Average | 45 | 37% | 3 |
| Below average | 11 | 9% | 2 |
| Low | 14 | 12% | 1 |
| Don't know/Unsure | 10 | 8% | 0 |
| Other | 0 | 0% | |
| No answer | 0 | 0% | |

*Table 5*

How would you rate the amount of time your institution allots for adopting (selecting) implementing and training faculty to use an innovation in the learning environment?

| | Frequency | Percent | Value |
|---|---|---|---|
| High | 8 | 7% | 5 |
| Above average | 36 | 30% | 4 |
| Average | 43 | 36% | 3 |
| Below average | 17 | 14% | 2 |
| Low | 11 | 9% | 1 |
| Don't know/Unsure | 5 | 4% | 0 |
| Other | 0 | 0% | |
| No answer | 1 | 1% | |

*Table 6*

How would you rate the ability of your institution's infrastructure to support new technology in the learning environment?

| | Frequency | Percent | Value |
|---|---|---|---|
| High | 10 | 8% | 5 |
| Above average | 47 | 39% | 4 |
| Average | 34 | 28% | 3 |
| Below average | 25 | 21% | 2 |
| Low | 4 | 3% | 1 |
| Don't know/Unsure | 0 | 0% | 0 |
| Other | 0 | 0% | |
| No answer | 1 | 1% | |

*Table 7*

Does your institution's infrastructure act as a barrier or an enabler to use innovation in your learning environment? (A barrier makes innovative practices harder, an enabler makes innovative practices easier).

| | Frequency | Percent | Value |
|---|---|---|---|
| Major enabler | 10 | 8% | 5 |
| An enabler | 38 | 31% | 4 |
| Slight enabler | 18 | 15% | 3 |
| Neutral | 19 | 16% | 2 |
| Slight barrier | 18 | 15% | 1 |
| A barrier | 11 | 9% | 0 |
| Major barrier | 4 | 3% | -1 |
| Other | 2 | 2% | |
| No answer | 1 | 1% | |

*Table 8*

To what extent do you think the leaders of your organization consider your opinions, ideas, and beliefs when making decisions?

| | Frequency | Percent | Value |
|---|---|---|---|
| High | 16 | 13% | 5 |
| Above average | 37 | 31% | 4 |
| Average | 42 | 35% | 3 |
| Below average | 11 | 9% | 2 |
| Low | 10 | 8% | 1 |
| Don’t know/Unsure | 3 | 2% | 0 |
| Other | 0 | 0% | |
| No answer | 2 | 2% | |

*Table 9*

The level of shared-decision making at your institution is ...

| | Frequency | Percent | Value |
|---|---|---|---|
| Much more than adequate | 4 | 3% | 5 |
| More than adequate | 31 | 26% | 4 |
| Adequate | 45 | 37% | 3 |
| Less than adequate | 21 | 17% | 2 |
| Much less than adequate | 11 | 9% | 1 |
| Don’t know/Unsure | 6 | 5% | 0 |
| Other | 0 | 0% | |
| No answer | 3 | 2% | |

*Table 10*

To what level does the culture of your institution, specifically shared decision making and communication serve as an enabler or a barrier to the selection, implementation and training of innovation in your learning environment? (A barrier makes innovative practices harder, an enabler makes innovative practices easier).

| | Frequency | Percent | Value |
|---|---|---|---|
| Major enabler | 7 | 6% | 5 |
| An enabler | 33 | 27% | 4 |
| Slight enabler | 19 | 16% | 3 |
| Neutral | 26 | 21% | 2 |
| Slight barrier | 20 | 17% | 1 |
| A barrier | 11 | 9% | 0 |
| Major barrier | 1 | 1% | -1 |
| Other | 0 | 0% | |
| No answer | 4 | 3% | |

*Table 11*

To what extent do you think the policies of your institution regarding the selection, implementation and training of innovation are fair, up to date, documented and well known? In other words, what is your overall satisfaction with your organization's rules and regulations regarding selection, implementation and training of innovation?

| | Frequency | Percent | Value |
|---|---|---|---|
| High | 7 | 6% | 5 |
| Above average | 27 | 22% | 4 |
| Average | 44 | 36% | 3 |
| Below average | 19 | 16% | 2 |
| Low | 10 | 8% | 1 |
| Don’t know/Unsure | 10 | 8% | 0 |
| Other | 2 | 2% | |
| No answer | 2 | 2% | |

*Table 12*

Would you describe the policies of your organization as rigid and difficult to change or fluid and easy to change?

| | Frequency | Percent | Value |
|---|---|---|---|
| Extremely rigid and difficult to change | 14 | 12% | 1 |
| Somewhat rigid and difficult to change | 29 | 24% | 2 |
| Probably about average | 50 | 41% | 3 |
| Somewhat fluid and easy to change | 14 | 12% | 4 |
| Extremely fluid and easy to change | 3 | 2% | 5 |
| Don't know/Unsure | 6 | 5% | 0 |
| Other | 4 | 3% | |
| No answer | 1 | 1% | |

*Table 13*

How would you rate the policies of your organization specifically related to the adoption, implementation and training of innovation?

| | Frequency | Percent | Value |
|---|---|---|---|
| Extremely appropriate – no need to change | 7 | 6% | 5 |
| Somewhat appropriate – needs a few minor changes | 34 | 28% | 4 |
| Appropriate – not bad, but could use some changes | 54 | 45% | 3 |
| Not appropriate – needs a many changes | 14 | 12% | 2 |
| Extremely inappropriate – needs a complete overhaul | 5 | 4% | 1 |
| Don't know/Unsure | 4 | 3% | 0 |
| Other | 2 | 2% | |
| No answer | 1 | 1% | |

*Table 14*

Do you think the policies of your institution act as an enabler or a barrier to the selection, implementation and training of innovation? (A barrier makes innovative practices harder, an enabler makes innovative practices easier

| | Frequency | Percent | Value |
|---|---|---|---|
| Major enabler | 4 | 3% | 5 |
| An enabler | 30 | 25% | 4 |
| Slight enabler | 27 | 22% | 3 |
| Neutral | 26 | 21% | 2 |
| Slight barrier | 22 | 18% | 1 |
| A barrier | 7 | 6% | 0 |
| Major barrier | 3 | 2% | -1 |
| Other | 2 | 2% | |
| No answer | 0 | 0% | |

*Table 15*

To what extent do you think the leaders of your institution consider the educational needs of learners when selecting, implementing and training for innovation?

| | Frequency | Percent | Value |
|---|---|---|---|
| High | 18 | 15% | 5 |
| Above average | 39 | 32% | 4 |
| Average | 42 | 35% | 3 |
| Below average | 10 | 8% | 2 |
| Low | 8 | 7% | 1 |
| Don't know/Unsure | 1 | 1% | 0 |
| Other | 0 | 0% | |
| No answer | 3 | 2% | |

*Table 16*

How would you rate the commitment of your institution to provide high quality instructional technology to your learners?

| | Frequency | Percent | Value |
|---|---|---|---|
| Very strong commitment | 26 | 21% | 5 |
| Strong commitment | 43 | 36% | 4 |
| Average | 31 | 26% | 3 |
| Weak commitment | 15 | 1212% | 2 |
| Very weak commitment | 2 | 2% | 1 |
| Don't know/Unsure | 1 | 1% | 0 |
| Other | 1 | 1% | |
| No answer | 2 | 21% | |

*Table 17*

Do you think that your institution's commitment to learning outcomes acts as an enabler or a barrier to the use of innovation in the learning environment? (A barrier makes innovative practices harder, an enabler makes innovative practices easier).

| | Frequency | Percent | Value |
|---|---|---|---|
| Major enabler | 19 | 16% | 5 |
| An enabler | 42 | 35% | 4 |
| Slight enabler | 24 | 20% | 3 |
| Neutral | 17 | 14% | 2 |
| Slight barrier | 9 | 7% | 1 |
| A barrier | 8 | 7% | 0 |
| Major barrier | 0 | 0% | -1 |
| Other | 1 | 1% | |
| No answer | 1 | 1% | |

*Table 18*

How would you rate the quality and quantity of evaluations specifically related to instructional technology?

| | Frequency | Percent | Value |
|---|---|---|---|
| Much more than adequate | 6 | 5% | 5 |
| More than adequate | 14 | 12% | 4 |
| Adequate | 52 | 43% | 3 |
| Less than adequate | 28 | 23% | 2 |
| Much less than adequate | 7 | 6% | 1 |
| Don't know/Unsure | 10 | 8% | 0 |
| Other | 2 | 2% | |
| No answer | 2 | 2% | |

*Table 19*

Do you think the quality and quantity of evaluations in your institution acts as an enabler or a barrier to the use of innovative practices in instructional technology in your learning environment? (A barrier makes innovative practices harder, an enabler makes innovative practices easier).

| | Frequency | Percent | Value |
|---|---|---|---|
| Major enabler | 7 | 6% | 5 |
| An enabler | 20 | 17% | 4 |
| Slight enabler | 20 | 17% | 3 |
| Neutral | 49 | 40% | 2 |
| Slight barrier | 13 | 11% | 1 |
| A barrier | 6 | 5% | 0 |
| Major barrier | 1 | 1% | -1 |
| Other | 4 | 3% | |
| No answer | 1 | 1% | |

*Table 20*

To what extent does your institution provide the support necessary to implement new instructional technology effectively?

| | Frequency | Percent | Value |
|---|---|---|---|
| High | 14 | 12% | 5 |
| Above average | 31 | 26% | 4 |
| Average | 43 | 36% | 3 |
| Below average | 23 | 19% | 2 |
| Low | 5 | 4% | 1 |
| Don't know/Unsure | 2 | 2% | 0 |
| Other | 0 | 0% | |
| No answer | 3 | 2% | |

*Table 21*

How would you rate the training support available? (Training refers to all the formal and informal support available related to implementing a new instructional technology).

| | Frequency | Percent | Value |
|---|---|---|---|
| Very strong | 19 | 16% | 5 |
| Strong | 35 | 29% | 4 |
| Average | 33 | 27% | 3 |
| Weak | 24 | 20% | 2 |
| Very weak | 7 | 6% | 1 |
| Don't know/Unsure | 1 | 1% | 0 |
| Other | 0 | 0% | |
| No answer | 2 | 2% | |

*Table 22*

How would you rate the technical support available? (Technical support refers to the ongoing support provided the faculty and learners have when hardware, software or network problems arise).

| | Frequency | Percent | Value |
|---|---|---|---|
| Very strong | 17 | 14% | 5 |
| Strong | 33 | 27% | 4 |
| Average | 41 | 34% | 3 |
| Weak | 22 | 18% | 2 |
| Very weak | 4 | 3% | 1 |
| Don't know/Unsure | 1 | 1% | 0 |
| Other | 1 | 1% | |
| No answer | 2 | 2% | |

*Table 23*

How would you rate the pedagogical support provided by your institution? (Pedagogical support refers to the assistance available related to applying innovative teaching approaches in your learning environment).

| | Frequency | Percent | Value |
|---|---|---|---|
| Very strong | 9 | 7% | 5 |
| Strong | 31 | 31% | 4 |
| Average | 50 | 41% | 3 |
| Weak | 16 | 13% | 2 |
| Very weak | 8 | 7% | 1 |
| Don't know/Unsure | 4 | 3% | 0 |
| Other | 1 | 1% | |
| No answer | 2 | 2% | |

*Table 24*

How would you rate the administrative leadership at your institution? (Administrative leadership refers to the commitment your managers/supervisors have to helping you do an effective job).

| | Frequency | Percent | Value |
|---|---|---|---|
| Very strong | 16 | 13% | 5 |
| Strong | 48 | 40% | 4 |
| Average | 26 | 21% | 3 |
| Weak | 18 | 15% | 2 |
| Very weak | 8 | 7% | 1 |
| Don't know/Unsure | 2 | 2% | 0 |
| Other | 0 | 0% | |
| No answer | 3 | 2% | |

*Table 25*

What level of influence do you have in the strategic planning process?

| | Frequency | Percent |
|---|---|---|
| Decision Maker – authority to make final decision(s) | 7 | 6% |
| Member of decision making team/committee | 34 | 28% |
| Member of a working group making recommendations | 25 | 21% |
| Concerned individual with little or no influence | 28 | 23% |
| No involvement in the process | 19 | 16% |
| Other | 5. | 4% |

*Table 26*

What is the primary reason that prompts your institution to migrate to a new instructional technology? In other words, why does your institution decide to adopt new instructional technology?

| | Frequency | Percent |
|---|---|---|
| We are constantly looking for new technology | 14 | 12% |
| Current technology is outdated and no longer effective | 16 | 13% |
| Current technology is no longer supported by vendor | 6 | 5% |
| Cost of current technology is too high | 2 | 2% |
| Cost of new technology is less compared to old | 0 | 0% |
| New technology better supports the learner outcomes | 34 | 28% |
| New technology is customizable to your institutional needs | 8 | 7% |
| Vendor demonstrations | 1 | 1% |
| Recommendations from other institutions | 1 | 1% |
| Faculty/student pressure | 7 | 6% |
| Don't know/unsure | 25 | 21% |
| Other | 5 | 5% |
| *no answer* | 2 | 2% |

*Table 27*

What is the secondary reason that prompts your institution to migrate to a new instructional technology? In other words, why does your institution decide to adopt new instructional technology?

| | Frequency | Percent |
|---|---|---|
| Current technology is outdated and no longer effective | 20 | 17% |
| Current technology is no longer supported by vendor | 7 | 6% |
| Cost of current technology is too high | 6 | 5% |
| Cost of new technology is less compared to old | 5 | 4% |
| New technology better supports the learner outcomes | 16 | 13% |
| New technology is customizable to your institutional needs | 17 | 14% |
| Vendor demonstrations | 0 | 0% |
| Recommendations from other institutions | 6 | 5% |
| Faculty/student pressure | 7 | 6% |
| N/A | 4 | 3% |
| Don't know/unsure | 29 | 24% |
| Other | 1 | 1% |
| *no answer* | 3 | 2% |

*Table 28*

What is the primary method your institution uses to identify new instructional technology for potential use in your learning environment?

| | Frequency | Percent |
|---|---|---|
| Recommendations by vendor | 0 | 0% |
| Conferences and/or trade shows | 9 | 7% |
| Recommendations by technical support personnel | 17 | 14% |
| Recommendations by a technical committee comprised of all stakeholders | 15 | 12% |
| Recommendations by faculty | 24 | 20% |
| Recommendations by students/learners | 1 | 1% |
| Don't know/unsure | 40 | 33% |
| Other | 12 | 10% |
| *no answer* | 3 | 2% |

*Table 29*

What is the secondary method your institution uses to identify new instructional technology for potential use in your learning environment?

| | Frequency | Percent |
|---|---|---|
| Recommendations by vendor | 7 | 6% |
| Conferences and/or trade shows | 8 | 7% |
| Recommendations by technical support personnel | 17 | 14% |
| Recommendations by a technical committee comprised of all stakeholders | 7 | 6% |
| Recommendations by faculty | 24 | 20% |
| Recommendations by students/learners | 6 | 5% |
| Don't know/unsure | 44 | 36% |
| Other | 6 | 5% |
| *no answer* | 2 | 2% |

*Table 30*

What is the primary method used to select specific new technology for your institution's learning environment (In other words, how do you decide on which new instructional technology you will adopt?

| | Frequency | Percent |
|---|---|---|
| Unilateral decision made by authority figure | 17 | 14% |
| Decision made by executive steering committee | 25 | 21% |
| Decision made by technical working group | 15 | 12% |
| Subordinate units can select from 'approved list' | 3 | 2% |
| Subordinate units can select their own but must go through an approval process | 7 | 6% |
| Decision made at lowest level for each unit/department | 3 | 2% |
| No coordinated decision making process | 9 | 7% |
| Don't know/unsure | 37 | 31% |
| Other | 3 | 2% |
| *no answer* | 2 | 2% |

*Table 30*

What is the secondary method used to select specific new technology for your institution's learning environment (In other words, how do you decide on which new instructional technology you will adopt?

| | Frequency | Percent |
|---|---|---|
| Unilateral decision made by authority figure | 12 | 10% |
| Decision made by executive steering committee | 20 | 17% |

| | | |
|---|---|---|
| Decision made by technical working group | 15 | 12% |
| Subordinate units can select from 'approved list' | 1 | 1% |
| Subordinate units can select their own but must go through an approval process | 7 | 6% |
| Decision made at lowest level for each unit/department | 4 | 3% |
| No coordinated decision making process | 10 | 8% |
| N/A | 8 | 7% |
| Don't know/unsure | 40 | 33% |
| *no answer* | 4 | 3% |

*Table 31*

Once the new instructional technology is selected, what is the primary method used to implement the technology? In other words, how does your institution ensure the new instructional technology is being used fully and effectively?

| | Frequency | Percent |
|---|---|---|
| Mandated for all units at the institution | 31 | 26% |
| Permits subordinate units to manage process | 25 | 21% |
| Subordinate units can select instructional technology | 19 | 16% |
| Institution provides no guidance (you can use or not) | 15 | 12% |
| Don't know/unsure | 19 | 16% |
| Other | 8 | 7% |
| *no answer* | 4 | 3% |

*Table 32*

Once the new instructional technology is selected, what is the secondary method used to implement the technology? In other words, how does your institution ensure the new instructional technology is being used fully and effectively?

| | Frequency | Percent |
|---|---|---|
| Mandated for all units at the institution | 12 | 10% |
| Permits subordinate units to manage process | 24 | 20% |
| Subordinate units can select instructional technology | 21 | 17% |
| Institution provides no guidance (you can use or not) | 12 | 10% |
| N/A | 14 | 12% |
| Don't know/unsure | 31 | 26% |
| Other | 3 | 2% |
| *no answer* | 4 | 3% |

*Table 33*

What is the primary method used to train the faculty/practitioners in the effective use of new instructional technology?

| | Frequency | Percent |
|---|---|---|
| Mandatory classes for all faculty/practitioners | 39 | 32% |
| Vendor training purchased with the technology | 10 | 8% |
| Optional training conducted by technical support | 41 | 34% |
| Self directed training | 15 | 12% |
| Training is not required | 5 | 4% |
| N/A | 0 | 0% |
| Don't know/unsure | 4 | 3% |
| Other | 2 | 2% |
| *no answer* | 5 | 4% |

*Table 34*

What is the secondary method used to train the faculty/practitioners in the effective use of new instructional technology?

| | Frequency | Percent |
|---|---|---|
| Mandatory classes for all faculty/practitioners | 6 | 5% |
| Vendor training purchased with the technology | 11 | 9% |
| Optional training conducted by technical support | 30 | 25% |
| Self directed training | 42 | 35% |
| Training is not required | 9 | 7% |
| N/A | 2 | 2% |
| Don't know/unsure | 12 | 10% |
| Other | 2 | 2% |
| *no answer* | 7 | 6% |

*Table 35*

Does your institution offer an incentive for learning a new instructional technology? (An incentive is a desirable condition or item offered in advance of training)

| | Frequency | Percent | Value |
|---|---|---|---|
| Yes | 16 | 13% | 5 |
| No | 77 | 64% | 0 |
| Don’t know/unsure | 23 | 19% | |
| Other | 2 | 2% | |
| *no answer* | *3* | *2%* | |

*Table 36*

Does your institution offer a reward for learning a new instructional technology? (A reward is a desirable condition or item given after training is completed)

| | Frequency | Percent | Value |
|---|---|---|---|
| Yes | 15 | 12% | 5 |
| No | 79 | 65% | 0 |
| Don't know/unsure | 21 | 17% | |
| Other | 2 | 2% | |
| *no answer* | *4* | *3%* | |

*Table 37*

What is the amount of time typically needed to bring about new instructional technology in your learning environment? (Time from identifying need for new technology until it is "routine practice")

| | Frequency | Percent |
|---|---|---|
| Five or more years | 1 | 1% |
| Four to five years | 4 | 3% |
| Three to four years | 10 | 8% |
| Two to three years | 14 | 12% |
| One to two years | 19 | 16% |
| Six months to one year | 10 | 8% |
| Less than six months | 4 | 3% |
| Don't know/unsure | 54 | 45% |
| Other | 2 | 2% |
| *no answer* | 3 | 2% |

*Table 38*

In your opinion, how effective is the strategic planning process at your institution?

| | Frequency | Percent |
|---|---|---|
| Extremely effective – no changes needed | 4 | 3% |
| Very effective – only minor changes needed | 13 | 11% |
| Effective – works,could use some improvements | 41 | 34% |
| Slightly ineffective – many changes needed | 24 | 20% |
| Extremely ineffective – usually leads to failure | 9 | 7% |
| Don't know/unsure | 26 | 21% |
| Other | 1 | 1% |
| *no answer* | 3 | 2% |

*Table 39*

How satisfied are you with how your institution manages the strategic planning process for new instructional technology?

| | Frequency | Percent | Value |
|---|---|---|---|
| Very satisfied | 9 | 7% | 5 |
| Somewhat satisfied | 26 | 21% | 4 |
| Neither satisfied or unsatisfied | 23 | 19% | 3 |
| Somewhat unsatisfied | 21 | 17% | 2 |
| Very unsatisfied | 15 | 12% | 1 |
| Don't know/unsure | 22 | 18% | |
| Other | 1 | 1% | |
| *no answer* | *4* | *3%* | |

# *Appendix D*

## *Suggested changes to RIPPLES(S) survey:*

-----Original Message-----
From: Daniel Surry [mailto:DSurry@usouthal.edu]
Sent: Tuesday, January 19, 2010 11:25 AM
To: Miller, COL Dave
Subject: RE: Request for permission to use the RIPPLES model survey

Overall, it looks really good to me.

Some comments:

1) It's usually a good idea to let people opt out of demographic questions with an option that says "Prefer not to say" - maybe they have to say their institution, but let them opt out of gender, age, and role. I think it just gives people a little better feeling if they at least have the option to opt out

2) Question 5 is sort of funky looking. "How would you rate the availability of financial resources for adopting (selecting) which innovation to use in the learning environment?" - not sure what you are asking there

3) So is question 15. "How innovative is your institution's infrastructure? In other words, how would you rate your institutions ability to support new technology in the learning environment?" That's kind of confusing.

4) I don't think question 28 really gets at "Learning" - seems more like an infrastructure question. " How would you rate the commitment of your institution to provide high quality instructional technology to your learners?"

5) I might have a little more explanation there at the end to encourage people to volunteer to be interviewed. The Phase 2 thing is sort of cursory, especially coming at the end of a long survey. Really explain to them the importance of being interviewed, what they are committing to, and maybe when they will be expected to do it.

Otherwise, looks really good

Dan
**********
Dan Surry
Associate Professor
University of South Alabama
College of Education

## *Appendix E*

## *Initial E-Mail requesting participation in the study*

E-Mail Subject Line: Research Study Participation Request

Dear Colleague,

My purpose in emailing is to request your participation in a study on diffusion of innovation in leader development programs. The research is designed to determine the strategies and methods used to adopt, implement and train for new instructional technology in the learning environment. The benefit to your institution will be information and recommendations that will help reduce costs associated with bringing new technology to your teaching and learning. Your participation is voluntary.

To participate, simply click the following web address:
http://www.filebox.vt.edu/users/_____.html
The link will take you to an informed consent form that outlines the details of this study.

After submitting this form, you will automatically be taken to the survey. Estimated time to complete is 20 to 25 minutes. The survey will be available until 18 Feb 2010 and your participation is most appreciated.

There are no incentives for completing this survey. I can only offer you the satisfaction of knowing you are participating in a worthwhile study that will help institutions of higher education successfully adopt new instructional technology.

Thank you for considering this survey.
Sincerely,

Dave Miller

# Appendix F

## *Informed Consent Form*

**VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY**
**Informed Consent for Participants in Research Projects Involving Human Subjects**

**Title of Project: A descriptive study of the process post-secondary institutions use to select and implement emerging instructional technologies, and how they develop their faculty for its classroom use – an analysis of leader development programs.**

**Investigator:**

Dave Miller, School of Education

**Research Advisor:**

Dr Mike Moore, School of Education

**Purpose of this Research/Project**

The purpose of this study is to seek information on the methods and strategies used by leader development organizations to adopt and implement new instructional technologies, and the methods used to train faculty on their effective use. Using data from this study, it will be possible to establish a set of current "best practices" for bringing new technology into the classroom.

**Procedures**

There are two phases to this study.

Phase I: The first phase consists of a questionnaire in the form of an online survey. You will be given a link to the online survey, a password and instructions on how to complete the questionnaire. You can begin the questionnaire at any time, but once started you must work through all questions until it is completed; there are no provisions to stop and start again. Your role in this phase is to complete the survey; you will have a week to do so.

Phase II: The second phase consists of interviews of selected individuals. These individuals will be selected based on the data collected in Phase I. At the end of the questionnaire in Phase I, you will have the opportunity to volunteer for an interview. If your institution is selected, you will be notified and arrangements made for a 30 minute interview. The interviews will be tape-recorded, subject to your consent, for subsequent data analysis. You can stop and start the recording at any time, as well as withdraw from the study. Your role in Phase II is to provide information to

questions about how your institution adopts, implements and trains for, new instructional technology.

**Risks**

The risks associated with this study are minimal

**Benefits**

Several benefits will come from this study. The data and subsequent analysis will add to the body of knowledge regarding technology adoption and diffusion in universities in general and in leader development programs specifically. The recommendations generated from the study will help decision makers at colleges and universities understand factors that enable or prevent technology adoption, implementation and effective training. These benefits are speculative and no promise or guarantee can be made. A summary of the results will be provided to you are your request.

**Extent of Anonymity and Confidentially**

Your participation in this study will be completely anonymous, and data will be analyzed and described in aggregate form only, with one caveat. Phase II of the study are interviews conducted on site of a selected leader development program. If you choose to participate in the interviews, you will have the opportunity to leave your name and email address at the end of the survey. Further, when publishing the results of this study, the name of your university will not be included. It is possible that the Institutional Review Board (IRB) may view this study's collected data for auditing purposes; however, since this is an anonymous survey, your identity would not be compromised. The IRB is responsible for the oversight of the protection of human subjects involved in research.

**Compensation**

There is no compensation for participating in this study.

**VII. Freedom to Withdraw**

You are free to withdraw from this study at any time; to do so, simply close your web browser. You may refuse to answer any questions by leaving them blank and you can remain in the study. If you have questions about the survey, you can contact the investigator via email at dave.miller@vt.edu

**VIII. Participants Resonsibilities**

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

- Submit this "Informed Consent" form,
- Fill out the survey that follows, and
- Submit it once complete.

**IX. Participant's Permission**

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:
Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects
Office of Research Compliance
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, VA 24060

_____ Date_____
Subject signature

_____ Date _____
Witness (Optional except for certain classes of subjects)

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:

Investigator:
Dave Miller
Phone: (540) 231-9455
Email: dave.miller@vt.edu

Faculty Advisor
David M. Moore
Phone: (540) 231-4991
Email: moored@vt.edu

# Appendix G

## *Email to institution points of contact requesting their support*

Email subject line: Request for support for research study

Dear [Title, Last Name]

I am writing to ask for your support for a research study I am conducting on the strategies and methods used by leader development programs to adopt (select), implement and train faculty on new instructional technology. I've labeled this the Innovation Migration Process, i.e., migrating to a new technology, and the intended result will be a set of guidelines for bringing new technology into the learning environment. The benefit to this study will be a better understanding of strategies that support successful implementation of new technology and potentially reduce the costs associated with an expensive endeavor.

I believe this study will be useful to institutions of higher education since we are experiencing technology advances at a rate that outstrips our ability to understand how best to use them. The "digital natives" are coming to campus expecting the latest technology, but time and budgets do not allow for mistakes in keeping the learning environment up-to-date. Your help with this study will provide insights into effective strategies for successful migration to new instructional technology.

The population for this study are the federal service academies, the senior military colleges, and the junior military colleges. There are two phases to this study. Phase I is an online questionnaire that volunteers from each of the institutions are asked to complete. The data collected from this survey will identify an institution that will serve as the model for a case study. Phase II consists of in-depth interviews of personnel from the selected institution. The result of the study will be recommendations to decision makers on best practices that lead toward success in the Innovation Migration Process.

I am asking if you or a designee would agree to serve as the point of contact for [institution]. This would entail: 1) identifying participants in four categories: executive decision makers, faculty, technical support personnel and instructional designers; 2) obtaining their voluntary agreement to participate; 3) providing email addresses to enable me to send them instructions and the link to the survey.

Please reply to this note if you accept or decline the invitation to be a POC. I appreciate your thoughtful consideration. In return, I will make the results of this study available to your institution.

Regards,

Dave Miller
Colonel, USA (ret)
Deputy Commandant for Leader Development
Virginia Tech Corps of Cadets

# Appendix H

## *Reminder E-Mail to Institutions Inviting Participation*

E-Mail Subject Line: Reminder: Research Study Participation Request

Dear Colleague,

**Please Note**: Survey Closes on Day, dd February 2010.

I apologize if you received this message even though you have already participated in this study. Given respondent anonymity, I am unable to selectively resend this reminder to those that have yet to respond. My thanks to those who have already completed the survey.

My purpose in emailing is to request your participation in a study on diffusion of innovation in leader development programs. The research is designed to determine the strategies and methods used to adopt, implement and train for new instructional technology in the learning environment. The benefit to your institution will be information and recommendations that will help reduce costs associated with bringing new technology to your teaching and learning. Your participation is voluntary.

To participate, simply click the following web address:
http://www.filebox.vt.edu/users/_____.html
The link will take you to an informed consent form that outlines the details of this study.

After submitting this form, you will automatically be taken to the survey. Estimated time to complete is 20 to 25 minutes. The survey will be available until 18 Feb 10 and your participation is most appreciated.

I can only offer you the satisfaction of knowing you are participating in a worthwhile study that will help institutions of higher education successfully adopt new instructional technology.

Thank you for considering this survey.
Sincerely,

Dave Miller
dave.miller@vt.edu

# Appendix I

## *Final Reminder E-Mail to Institutions Inviting Participation*

E-Mail Subject Line: Reminder: Research Study Participation Request

Dear Colleague,

**Final Reminder: Survey Closes Tomorrow (Wednesday) Night**

I apologize if you received this message even though you have already participated in this study. Given respondent anonymity, I am unable to selectively resend this reminder to those that have yet to respond. My thanks to those who have already completed the survey.

My purpose in emailing is to request your participation in a study on diffusion of innovation in leader development programs. The research is designed to determine the strategies and methods used to adopt, implement and train for new instructional technology in the learning environment. The benefit to your institution will be information and recommendations that will help reduce costs associated with bringing new technology to your teaching and learning. Your participation is voluntary.

To participate, simply click the following web address:
http://www.filebox.vt.edu/users/_____.html
The link will take you to an informed consent form that outlines the details of this study.

After submitting this form, you will automatically be taken to the survey. Estimated time to complete is 20 to 25 minutes. The survey will be available until 18 Feb 10 and your participation is most appreciated.

I can only offer you the satisfaction of knowing you are participating in a worthwhile study that will help institutions of higher education successfully adopt new instructional technology.

Thank you for considering this survey.
Sincerely,

Dave Miller
dave.miller@vt.edu

# Appendix J

## *Interview Protocol:*

A. Administrative matters:

The interview schedule, time and place, will be arranged by the institution POC. The interview protocol and consent forms will be emailed to each interviewee when confirming the date, time and location for the interview. The interviewee will be asked to review the questions and read the consent form ahead of the interview to prepare for the interview. This will keep the interview as short as possible, while ensuring answers to the questions are well considered.

Also, during the initial contact by email, the interviewee will be asked if they have a curriculum vita they would be willing to share. Obtaining a copy of this prior to the interview will help understand their responses and guide the line of questioning.

At the time of the interview, the interviewee will be asked for a telephone number and permission to conduct a follow-up telephonic interview should questions arise, or points require clarification.

B. Interviewer Introduction:

My name is Dave Miller and I am doing research on how institutions of higher education adopt, implement and train faculty to use new instructional technology in the learning environment. This process, which I call the Innovation Migration Process, consists of the initial consideration to move to a new innovation, the selection decision, how the innovation is implemented within the institution, and finally, how faculty are trained to use it effectively. The process is considered complete when the innovation is routinely used in the learning environment. I am most interested in the factors and conditions that prompt an institution to begin this process, the enablers and barriers to implementing and training, and the policies and strategies that lead to success. The intended outcome of this research is to identify best practices and develop recommendations that will help institutions successfully introduce new instructional technology into the learning environment. In addition to improving learning outcomes, these recommendations may help reduce costs in what the literature shows to be an expensive undertaking.

B. Obtain permission to audiotape the interview.

C. Discuss issues of confidentiality and anonymity.

D. Obtain signature on informed consent form.

E. Start tape and ask the following:
- "Please state your name and institution" (wait for statement of name and institution)
- "I would like you to confirm for the record that I'm audio taping this interview?" (wait for affirmation)
- "…and you give me permission to do so?" (wait for affirmation)
- "You understand that you are not required to participate in this study and that you may withdraw at any time – or decline to answer any specific question – without being subject to adverse action?" (wait for affirmation)
- "…and do you wish to participate at this time?" (wait for affirmation)
- Continue with the questions, as follows…

1. Please describe your role and responsibilities at [_____].
    a. In your role, do you use instructional technology?
2. Have you ever been involved in bringing new instructional technology into the learning environment?
    a. If yes, describe your experience
    b. If no, describe your understanding of how the process works.
3. What prompts [_____] to consider moving to a new instructional technology?
4. What strategies are used to select the technology? In other words, what method is used to decide the "winning" technology that will be used in the learning environment?
    a. Do you believe these strategies are effective or ineffective?
5. What strategies and policies are used to implement the new instructional technology? In other words, how does [_____] ensure the technology is being used fully and effectively?
    a. In your opinion, are these effective or ineffective?
    b. Are learners educational needs considered in this process?
    c. How is this evaluated or assessed?
6. How are your faculty/practitioners trained to use the new instructional technology?
    a. Is this a dynamic or static program, meaning is it the same for every new technology or does it change based on the technology?
    b. Are there incentives or rewards provided to faculty to encourage training?
7. Do you believe there are adequate resources given to this process?
    a. Time?
    b. Funding?
8. Do you believe the infrastructure at [_____] is adequate to support the instructional technology in your learning environment? Infrastructure includes communication systems, networks, hardware, software, administrative and production facilities, teaching resources and student resources.
    a. Do you view this as a barrier or an enabler to migrate to new instructional technology?
9. How would you describe the level of 'innovativeness' at [_____]? By this I mean, how ready is [_____] to migrate to a new

instructional technology? Does the culture of [_____] support new ideas and technology?
    a. Do you see this as an enabler or a barrier?
10. In your opinion, do you think the policies at [_____] concerning the adoption, implementation and training of innovation are fair, up to date, documented and followed? In other words, how satisfied are you in the process used at [_____]?
11. To what extent does [_____] provide the support necessary to implement new instructional technology?
    a. Is the technical support to "fix" problems with the technology adequate?
    b. Is the pedagogical support, meaning assistance related to applying innovative teaching approaches adequate?
    c. How would you rate the level of support for a new instructional technology demonstrated by the leadership at [_____]? In other words, how committed are the leaders to the successful migration?
12. How long does it usually take to bring about new instructional technology in your learning environment?
13. What, in your opinion are the most effective strategies or policies to bring new instructional technology into your learning environment?
14. Are you satisfied with this process at [_____]?
15. What other comments would you like to make about the Innovation Migration Process at [_____]?

# Appendix K

## *Request for permission to conduct interviews at [institution]*

Address
Institution

Dear [Title, Last name],

Pursuant to our phone conversation on dd February 10, I am writing to officially request permission to conduct interviews at [institution]. This visit is the second part of a two phase study designed to explore the strategies leader development programs use to migrate to new instructional technology in the learning environment.

The visit will consist of interviews with selected executives, faculty, technical support personnel and instructional designers, and should last less than one hour each. The intended result of this study is to identify best practices that lead to successful migration to new instructional technology. My hope is that, using the recommendations from the study, institutions of higher education will be able to save time and money when adopting new instructional technology. I will be happy to share the results with your institution once I've completed the research.

Thank you for your thoughtful consideration and I look forward to your reply.

Sincerely,

Dave Miller
Colonel, USA (ret)
Deputy Commandant for Leader Development
Virginia Tech Corps of Cadets
dave.miller3@vt.edu

# Appendix L

## RIPPLES(S) average scores by institution

| Question | Institution average score | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K | L |
| Q5 | 2.33 | 2.00 | 2.63 | 4.20 | 1.50 | 3.43 | 3.56 | 2.75 | 1.93 | 1.50 | 3.00 | 2.75 |
| Q6 | 2.92 | 2.67 | 2.56 | 3.40 | 2.00 | 3.50 | 3.52 | 3.00 | 2.80 | 1.25 | 3.00 | 3.00 |
| Q8 | 3.42 | 2.67 | 2.94 | 4.20 | 2.50 | 3.86 | 3.56 | 2.75 | 2.87 | 2.25 | 3.00 | 2.75 |
| Q9 | 3.17 | 2.33 | 1.44 | 3.40 | 1.50 | 3.36 | 3.28 | 3.25 | 2.07 | 0.75 | 2.50 | 3.25 |
| Q10 | 3.42 | 4.00 | 3.69 | 3.60 | 4.50 | 3.50 | 2.56 | 3.50 | 3.07 | 2.25 | 2.00 | 3.50 |
| Q11 | 2.67 | 3.67 | 3.25 | 3.33 | 3.00 | 2.86 | 2.44 | 3.50 | 2.33 | 1.75 | 2.50 | 3.50 |
| Q12 | 2.67 | 2.00 | 2.56 | 3.44 | 1.50 | 2.86 | 2.72 | 3.25 | 2.20 | 0.50 | 2.00 | 3.25 |
| Q13 | 2.67 | 0.67 | 2.63 | 3.10 | 2.00 | 3.50 | 2.84 | 2.25 | 2.47 | 2.00 | 3.00 | 2.25 |
| Q14 | 2.67 | 2.00 | 2.38 | 2.90 | 2.50 | 2.43 | 2.80 | 2.50 | 2.13 | 3.50 | 3.00 | 2.50 |
| Q15 | 3.42 | 3.33 | 2.63 | 3.80 | 2.00 | 3.50 | 3.36 | 2.75 | 2.60 | 1.75 | 3.00 | 2.75 |
| Q16 | 2.67 | 2.00 | 2.00 | 3.40 | 1.50 | 2.64 | 2.96 | 2.25 | 2.27 | 0.75 | 2.00 | 2.25 |
| Q17 | 3.33 | 3.33 | 3.44 | 3.50 | 3.00 | 3.57 | 3.40 | 3.25 | 3.40 | 2.25 | 3.00 | 3.25 |
| Q18 | 3.08 | 4.33 | 3.25 | 3.90 | 3.50 | 4.00 | 4.16 | 2.75 | 3.13 | 2.50 | 2.00 | 2.75 |
| Q19 | 2.67 | 3.00 | 3.19 | 3.60 | 3.00 | 3.64 | 3.36 | 2.25 | 2.93 | 1.75 | 2.00 | 2.25 |
| Q20 | 2.58 | 3.00 | 2.88 | 2.80 | 1.00 | 2.07 | 2.88 | 2.00 | 2.20 | 2.25 | 2.50 | 2.00 |
| Q21 | 1.92 | 2.00 | 2.81 | 2.70 | 1.50 | 2.50 | 2.60 | 2.25 | 2.13 | 1.50 | 2.00 | 2.25 |
| Q22 | 3.17 | 3.00 | 2.50 | 3.60 | 2.50 | 3.79 | 3.56 | 2.00 | 2.80 | 2.25 | 2.50 | 2.00 |
| Q23 | 3.17 | 2.67 | 3.06 | 3.80 | 2.00 | 3.93 | 3.64 | 1.75 | 2.93 | 1.25 | 3.00 | 1.75 |
| Q24 | 3.42 | 2.67 | 3.31 | 3.70 | 3.00 | 3.50 | 3.40 | 2.75 | 2.60 | 2.75 | 3.00 | 2.75 |
| Q25 | 2.83 | 2.67 | 3.06 | 3.40 | 1.00 | 3.57 | 3.16 | 1.25 | 3.33 | 1.25 | 3.00 | 1.25 |
| Q26 | 3.17 | 3.33 | 3.56 | 3.50 | 4.00 | 3.36 | 3.12 | 3.50 | 3.20 | 1.75 | 2.50 | 3.50 |
| Q43 | 0.83 | 0.00 | 0.31 | 0.30 | 0.00 | 2.50 | 0.20 | 0.00 | 1.33 | 0.00 | 0.00 | 0.00 |
| Q44 | 1.67 | 0.00 | 0.63 | 0.00 | 0.00 | 2.14 | 0.40 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 |
| Q46 | 1.42 | 3.33 | 2.00 | 3.20 | 3.00 | 2.50 | 2.16 | 2.00 | 1.73 | 1.50 | 2.50 | 2.00 |
| Q48 | 1.83 | 1.33 | 2.31 | 2.89 | 3.50 | 3.14 | 2.96 | 2.25 | 1.87 | 1.25 | 1.00 | 2.25 |
| Total avg | 67.12 | 62.00 | 65.02 | 79.66 | 55.50 | 79.65 | 72.60 | 59.75 | 60.65 | 40.50 | 58.00 | 59.75 |

# Appendix M

| Study Population Demographics | | | | | |
|---|---|---|---|---|---|
| Institution | Student Enrollment | Number of Faculty | | Student Ratio | Retention |
| | | Full time (M/F) | PT | | |
| Georgia Military College | 1,237 | 40 (21/19) | 37 | 26:1 | 63% |
| Maine Maritime Academy | 858 | N/A | N/A | N/A | 86% |
| Marion Military Institute | 293 | 15 (9/6) | 5 | 20:01 | 71% |
| New Mexico Military Institute | 467 | 72 (48/24) | 1 | 6:01 | 44% |
| North Georgia College & State Univ | 4,922 | 183 (90/93) | 125 | 20:01 | 75% |
| Norwich University | 3,104 | 132 (87/45) | 164 | 23:01 | 77% |
| SUNY Maritime | 1,324 | 59 (48/11) | 45 | 20:01 | 69% |
| Texas A&M | 45,380 | 2,116 (1537/579) | 108 | 19:01 | 72% |
| The Citadel | 3,306 | 163 (119/44) | N/A | 14:01 | 82% |
| US Air Force Academy | 4,524 | 135 (108/27) | 4 | 34:1 | 93% |
| US Coast Guard Academy | 995 | 44 (29/15) | 7 | 23:01 | 93% |
| US Merchant Marine Academy | 949 | 88 (78/10) | N/A | 11:01 | 89% |
| US Military Academy | 1,244 | 359 (258/101) | 48 | 3:01 | 99% |
| US Naval Academy | 4,479 | 379 (273/106) | 51 | 12:01 | 96% |
| Valley Forge Military Academy | 216 | 12 (9/3) | 13 | 18:01 | 67% |
| Virginia Military Institute | 1,397 | 115 (97/18) | 22 | 12:01 | 77% |
| Virginia Tech | 28,470 | 1,340 (948/392) | 56 | 19:01 | 89% |
| Virginia Women's Institute of Ldrship | 1,755 | 75 (36/39) | 155 | 15:01 | 72% |
| Wentworth Military Academy | 602 | 14 (9/5) | 42 | 15:01 | 78% |