Stages of Concern of Defense Systems Management College Faculty about Technology-Based Education and Training

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(ABSTRACT)

The Defense Systems Management College (DSMC) is beginning a major transition from its traditional classroom training methods to technology-based education and training. Conventional classroom courses will be rewritten and restructured to a computer-based format and be delivered on-line. According to the Concerns-Based Adoption Model, the faculty will experience concerns during the process of adopting this innovation. Identification of these concerns can assist in selecting appropriate interventions to minimize problems and to ease the adoption process.

This study had two purposes. The first was to identify the Stages of Concern of the DSMC faculty toward the use of technology-based education and training by measuring faculty responses to the Stages of Concern (SoC) Questionnaire. The second was to determine appropriate interventions to assist the faculty through the change process.

The study accomplished both purposes. All teaching faculty (N=135) received the questionnaire about their concerns and issues with this innovation, and 126 responses were returned (93% response rate). A total of eighty-one respondents (64%) reported no experience with technology-based courses, and the composite faculty SoC profile correspondingly reflected the “nonuser” category. No significant differences in Stages of Concern were found between groups of faculty when divided by common demographic criteria such as years of teaching experience, civilian or military status, and experience with educational technology.

Quantitative methods of analysis included SoC profile comparison, High Stage Score and Second High Stage Score analysis, analysis-of variance (ANOVA), and multivariate analysis of variance (MANOVA). Qualitative methods were also used to analyze responses to an open-ended question on the survey instrument. Results reflected a general lack of knowledge and awareness about the innovation from the faculty and strong personal concerns about what impact

it will have on them. The faculty clearly displayed a negative attitude toward this innovation and seemed unconvinced that it was the optimal solution. Written responses to the open-ended question provided key insight into faculty attitudes. The majority of concerns identified were educational issues, particularly dealing with the effectiveness of a computer-based format when teaching highly-interactive management courses.

Based on these results, recommended intervention strategies for DSMC were generated. These strategies focus on the need for better information dissemination about educational technology and for a realistic implementation plan. More importantly, interventions were recommended to provide incentives for faculty to increase proficiency with educational technology and the use of technology in their courses.

DEDICATION

I dedicate this study to the faculty and staff of the Defense Systems Management College, whose important mission is to provide education and training for the Department of Defense acquisition workforce. The tremendous value of this product can be seen clearly in terms of United States military capability which helps maintain stability and peace around the world. In these days of downsizing, streamlining, rightsizing, and "doing more with less" while, at the same time, getting it "quicker, cheaper, better," the contributions of the Defense Systems Management College are more important than ever.

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My loving wife, Jan, for tolerating the whole thing, and always being there to listen. With one in graduate school and one in law school, she always had lots of listening to do.

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INTRODUCTION

> "There is no more delicate matter to take in hand,
> nor more dangerous to conduct, nor more doubtful
> in its success, than to be a leader in the introduction
> of changes. For he who innovates will have for enemies
> all those who are well off under the old order of things,
> and only lukewarm supporters in those who might be
> better off under the new."
>
> Niccolo Machiavelli – 400 years ago

In the mid-1990s, the Federal Government began experiencing large budget cuts and significant downsizing. Similarly, education and training programs for federal workers in the Department of Defense (DoD) are also in the midst of great change. In November 1990, the Defense Acquisition Workforce Improvement Act (DAWIA) mandated career development requirements, including education and training, for those DoD employees who make up the acquisition workforce. This legislation, Public Law 101-510, also mandates professional certification for career advancement of DoD acquisition workforce members. To reach more of this workforce and reduce costs, DoD will move from traditional educational methods toward greater use of current technologies (world wide web and internet) supporting computer-based instruction (Defense Acquisition University, 1997). This study used the Concerns-Based Adoption Model (CBAM) to assess the readiness of faculty at one DoD institution, the Defense Systems Management College (DSMC), to adopt the innovation of technology-based education.

The CBAM model, developed at the University of Texas in the early 1970s, will be addressed more completely in Chapter II. CBAM research was funded by federal grant from the National Institute of Education with a goal to better understand the failures of many educational innovations of the 1960s (Hall, Wallace, and Dossett, 1973). This research also developed methods to assist educational institutions in their ability to adopt future innovations. CBAM uses change theory to explain the innovation adoption process in the educational environment. The change theories of Fuller, Havelock, Rogers, and Shoemaker contribute directly to CBAM which is framed around three concepts: *Stages of Concern* about an innovation, *Levels of Use* of an innovation, and *Innovation Configuration* (Hall and Hord, 1987). This study addresses the first CBAM concept, *Stages of Concern*, and its relationship to the innovation of interest at DSMC.

The population affected by the innovation of technology-based education and training is the defense acquisition workforce, a group of approximately 177,000 government employees, both civilian and military, responsible for the procurement and life-cycle support of weapon systems for DoD (Jefferson Solutions Report, Sep 97). The Defense Reform Act of 1997 proposes a 40% reduction in the size of the workforce over a four-year period, starting with 40,000 jobs in 1998 (Bender, 1997). This legislation would also eliminate an additional 84,000 jobs in the following three years. *The Washington Post* also reports that “[d]efense is planning to cut about 125,000 acquisition jobs in the next few years…” (Causey, 1997, p. B2). Those employees who remain will be asked to continue the existing pace of work in the department. Therefore, this work must be done more efficiently with fewer people. One large area of potential efficiency increase is in the education and training of acquisition workforce members.

There are 11 career fields (Appendix A) within the DoD acquisition workforce, with advancement within a career field dependent upon professional certification. The three levels of certification are: Level I, Entry Level, Level II, Intermediate Level, and Level III, Senior level. Level I certification is expected within two or three years of joining the acquisition work force. Level II certification is intended for mid-level managers or technicians with eight to ten years of experience, and Level III certification is for senior management with fifteen or more years of experience in acquisition. Each level of certification has three components: years of job experience, formal academic credits and degrees, and professional education and training. The third component of certification is the subject of most government emphasis, since it is the one which can be influenced most readily and is directly job (performance) related.

The Defense Acquisition University (DAU), a consortium of 11 schools (Appendix B), offers professional education for certification through a variety of courses, most of which are specific to a particular career field. The majority of these courses exist in the traditional classroom setting with the classic delivery methodologies such as lecture, discussion, group exercises, and case studies. These courses, taught at specific locations (either in-residence at a consortium school or on-site at a participating workforce location), tend to be costly in terms of travel time, travel expense, and lost productivity while students and instructors are away from the workplace attending courses. To reduce these costs and the number of required faculty, DAU has proposed an aggressive plan for the implementation of technology-based education and training (Defense Acquisition University, 1997). This plan will use distance learning methods new not only to the majority of the faculty in the consortium schools, but also to the students. This major change for faculty and students will require extensive revisions to the current course structure and delivery methods and is the cause of much anxiety and concern. This study measured the resultant concerns of the faculty at one DAU consortium school, the Defense Systems Management College (DSMC) and recommended appropriate interventions for DSMC management.

DSMC, located at Fort Belvoir, Virginia, is the only DAU consortium school that is not sponsored by one of the military services (Army, Navy, Air Force, or Marines). Instead, DSMC is sponsored by the Office of the Secretary of Defense (OSD) and its total funding comes through DAU. Other consortium schools receive a substantial portion of their funding from the sponsoring service. Due to OSD oversight and chain-of-command, DSMC is much more tightly controlled and less autonomous than other consortium schools. Approximately two-thirds of the faculty are civilian DoD employees, with the remaining one-third being military officers on active duty. Generally, civilian instructors come from federal civil service with at least 20 years of technical experience, and military instructors come from military assignments with comparable levels of acquisition and operational experience. The blend of civilian and military instructors is consistent with the student population in most classes and is regarded as an asset to DSMC and a positive contributor to the effectiveness of its courses.

DSMC has approximately 135 members on the teaching faculty. The military professors usually serve a three-year tour of duty, after which they return to assignments within their service. On the other hand, civilian instructors usually stay at DSMC long term, until they move to other federal employment or retire. Most professors have at least one graduate degree and about 12% have earned doctoral degrees. DSMC courses are generally regarded as senior management courses and are taught at the graduate level. The majority of the courses are one to two weeks in duration, except the Advanced Program Management Course (APMC), a 14-week in-residence course. The APMC is the flagship course of DSMC, required by law for major program managers within DoD. The 13 academic departments at DSMC sponsor professional courses unique to their career fields (Appendix C). The college is led by a Commandant, a general officer from one of the services. The military services rotate the position of Commandant among the services in a two-year cycle. The Commandant reports directly to the President of the DAU, a senior executive in the federal civil service.

This section introduced the general organization and primary mission of the Defense Acquisition University Consortium and the Defense Systems Management College. The next section discusses issues resulting from the DAU transition to technology-based education and training.

Background of Problem

Existing DAU courses employ traditional classroom delivery methods. They are designed to maximize the concept that, while taking these courses, adult learners will enhance the learning process as they interact with each other, sharing experiences and ideas. Class size is usually 30 to 36 students seated at six per table. This seating arrangement encourages students to work as teams in small groups as they discuss course material and participate in class exercises. This methodology has worked well for years but is very resource-intensive for two reasons: classes must be relatively small to allow for maximum interaction, and students spend much time away from their offices (while in class, or traveling to and from class). DAU estimates that in Fiscal Year 97 more than 440,000 work days (approximately 250 work years) will be spent away from the job at classroom courses (Defense Acquisition University, 1997, p. 3-5). This loss of time puts additional strain on DoD, because the work of the department still needs to be done and downsizing results in fewer people available to do it.

DoD has also recently initiated a requirement for each member of the acquisition workforce to receive 40 hours of continuing education every two years (Deputy Under Secretary of Defense [Acquisition Reform] Memorandum, 1996, August 7). This 40-hour requirement is in addition to the established educational requirements for professional certification. Thus, the immediate problem for DAU is to provide greater services with fewer resources, demanding changes to current approaches to education and training. The major challenge for DAU and the consortium schools is to re-design and re-write existing courses appropriately for the specific audience, level of instruction, and mode of delivery.

To meet this challenge, DAU plans to offer computer-based courses (on-line web-based) which may be taken at the student's own workplace or at home. This delivery method of instruction, self-paced and without travel requirements, allows much more flexibility in the student's schedule. DAU's aggressive plan calls for the conversion of over 80 courses to computer-based delivery within the next three years (Defense Acquisition University, 1997). This conversion effort is quite large and uses needs assessments, course design, development, delivery, and evaluation methods with which few faculty members are familiar. Many issues and questions will arise as the new courses are developed, such as the following: What is the most appropriate way to present specific course material? How will instructors get feedback on student performance? What is the best use of graphics or animation? Will the courses be interesting and challenging for the student? Can videos be used? What are the copyright issues? How must case studies or exercises be modified? How will faculty be trained? and How will students and courses be evaluated? Perhaps the most significant change for the consortium schools will be that faculty members will change from classroom instructors to facilitators of computer-based courses. This transition requires different instructional skills and extensive re-training, engendering uncertainty and concern among faculty.

This uncertainty is due to the real fear of termination with the Federal Government. During the next three years, the transition plan to technology-based education and training calls for a reduction in faculty across the 11 consortium schools (Defense Acquisition University, 1997, p. 7-30). Even though civilian professors at DSMC are civil service employees, they do not have traditional government career protection and work on annual contracts. Many of these professors come from career civil service jobs in the Federal Government where they have demonstrated high levels of knowledge and expertise in their respective fields. This professional experience has made them highly desirable as professors at DSMC, where their job is to educate the professional acquisition workforce. Unfortunately, due to the classification of the faculty jobs at DSMC as "excepted service" positions (as opposed to "career service" positions) these professors lost a safety net when they accepted positions at DSMC. This safety net has not been a problem during the 26-year history of DSMC, because there have never been federal layoffs there; however, faculty perceive the current downsizing and the movement toward computer-based instruction as a clear threat to future employment.

Statement of Problem

The transition to technology-based education and training within the DAU consortium is a huge change from the traditional classroom scenario where course material is transmitted face-to-face, from professor to student. This innovation is necessary due to Federal Government downsizing coupled with an increased demand for professional certification courses for the acquisition workforce. Based on the CBAM research done at the Research and Development Center for Teacher Education (RDCTE) at the University of Texas-Austin (Hall, Wallace, and Dossett, 1973), the faculty at DSMC will have various concerns about the merits of this innovation and the institutional process by which it will be implemented. These concerns are different for each individual and are based on one's experience, attitude, and perceptions. Research has shown that concerns expressed by individuals adopting educational innovations progress from a focus on *self*, to *task*, to *impact* (Fuller, 1969). The progression from concerns about *self* (for example, do I understand this innovation?) to concerns about *impact* (for example, will the students learn more with this innovation in place?) is developmental in nature.

This technology-based innovation will result in major changes to the way DSMC does business. Courses will be developed differently, taught differently, and certainly evaluated differently. As noted by Lippitt, Watson, and Westley (1958), these changes, and the concerns caused by them, are likely to result in resistance to the adoption of this innovation. Since DAU has mandated this change, the leadership at DSMC has a vested interest in successful implementation of this innovation. To improve the chances for successful implementation, interventions are planned during the change process. These interventions will be based on the faculty's knowledge and concerns about the innovation. The concerns of DSMC faculty toward technology-based education and training had never been identified and the Stages of Concern portion of the CBAM model offered an excellent method of doing this. One goal in this study was to assess the readiness of DSMC faculty to change from traditional classroom delivery to computer-based delivery. The analysis identified the concerns of faculty members so that appropriate interventions could be recommended.

Purpose of Study

This study had two purposes. The first was to identify the Stages of Concern (SoC) of the faculty at DSMC toward technology-based education and training, using the SoC Questionnaire (SoCQ) with an open-ended question of concern. The second purpose was to determine appropriate interventions to assist the faculty through the change process.

Research Questions

1. What is the composite Stages of Concern Profile of DSMC faculty members about technology-based education and training?
2. Do DSMC civilian and military faculty members differ in their Stages of Concern?
3. Do DSMC faculty members with varied levels of teaching experience differ in their Stages of Concern?
4. Do DSMC faculty members with varied lengths of service with the Federal Government differ in their Stages of Concern?
5. Do faculty members with <u>some</u> experience taking technology-based courses and faculty members with <u>no</u> experience taking technology-based courses differ in their Stages of Concern?

Significance of Study

This study examined an imminent major change at DSMC. Unwanted, uninvited change is always difficult, but change is nonetheless continuous and inevitable. As Niccolo Machiavelli noted 400 years ago, "There is no more delicate matter to take in hand, nor more dangerous to conduct, nor more doubtful in its success, than to be a leader in the introduction of changes. For he who innovates will have for enemies all those who are well off under the old order of things, and only lukewarm supporters in those who might be better off under the new" (cited in Tushman and O'Reilly, 1997, p. 36). This study fulfills the need to provide an understanding of how faculty concerns affect change and innovation at DSMC. The innovation of interest, technology-based education and training, will significantly alter the structure of existing courses and the faculty's role in the development and presentation of these courses.

According to Lippett, Watson, and Westley (1958), general opposition to any kind of change is most likely to occur at the beginning of the change process. This resistance can often grow out of a combination of fear and ignorance and may be explained and predicted by exploring the concerns of faculty as they try to prepare themselves for this innovation. The DAU Implementation Plan lays the framework justifying the innovation of technology-based education and training. Rogers and Shoemaker (1971) define an innovation as an "idea, practice, or object perceived as new by an individual" (p. 19). Whether or not an idea is new, as measured by the lapse of time since its discovery or first use, is unimportant. The perceived or subjective newness of the idea determines the reaction to it. If the idea seems new to the user, it is an innovation. Computer-based courses are a new idea to the DAU consortium and clearly fit this definition of innovation.

This study provided the first comprehensive examination of faculty concerns about an innovation in the DoD education and training environment. This study was unique because an assessment of innovation and change using the CBAM model has never been conducted to measure faculty concerns in a DoD educational institution. The CBAM model had previously been used three times in DoD for various applications. Barucky (1984) and Bernier (1990) used CBAM to explore concerns about leadership development and professional military education. Merz (1996) used the CBAM model to identify concerns of managers about a new delivery mode of training in the Defense Finance and Accounting Service.

This study built upon the research of Barucky, Bernier, and Merz and demonstrated the utility of the concerns theory in an environment which has not previously been studied, a major educational innovation in a Department of Defense institution comprised of both military and civilian faculty. Since the SoCQ instrument had not been used in this environment, results from this study filled this void in the body of knowledge about concerns theory. Additionally, this study provided the framework of appropriate intervention strategies for DSMC and DAU consortium faculty during a period of substantial change based on results of the SoCQ survey and in-depth site visits to other institutions in transition. This section discussed the importance of this research to the leadership at DAU and DSMC. The next section will address some limitations to the scope of the study.

Limitations

The DSMC faculty is in the midst of many large organizational changes from downsizing and reorganizing the staff to outsourcing its educational products and services. Many of these changes are still in the early stages and the final outcomes remain uncertain. The purpose of this study is to identify faculty members' Stages of Concern about technology-based education and training; but isolation of only those faculty concerns related to this particular change may be difficult. Other ongoing changes in the Federal Government could certainly play a large part in shaping faculty attitudes and concerns. Additionally, due to differences in faculty composition and organizational missions between DSMC and other DAU consortium schools, results from this survey may have only limited applicability to other schools.

Summary

This chapter introduced the Concerns-Based Adoption Model (CBAM) and explained how the Stages of Concern concept of CBAM will be used to identify concerns of faculty members at the Defense Systems Management College (DSMC). This research uses a proven survey instrument, the Stages of Concern Questionnaire, to assist in the collection and analysis of data.

Methods of course development and course delivery at DSMC are changing significantly due to Federal Government downsizing, coupled with increased education and training requirements for the Department of Defense acquisition workforce. The innovation of technology-based education and training is being adopted at DSMC in response to these trends. Resultant changes in teaching methods and course structure may be met with resistance and fear from the faculty. Proper identification of faculty concerns will assist DSMC leadership in moving the college through this change process.

Chapter I provided an introduction to the study, including a discussion of the problem and the nature of the research. Chapter II explores fundamental change theory and several change models upon which this study is based.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter reviews the literature on change relevant to this study and the development of the Concerns-Based Adoption Model (CBAM). The focus of the study will be on the following theorists of change: Lewin (1951), Rogers and Shoemaker (1971), Havelock (1973), Lippitt, Watson and Westley (1958), Fuller (1969), Fullan (1991), and Hall (1979). Their research provides the basis for various theories and models in the educational change process, CBAM, and the foundation for this study.

Change Process

Change theory is based on the individual and organizational aspects of the change process. Kurt Lewin (1951) developed his *field theory* to explain forces that cause change to occur. Lewin assumes that in any situation there are both *driving forces* and *restraining forces* that may influence change. *Driving forces* are those forces affecting a situation that are pushing in a particular direction; they tend to initiate a change and keep it going. *Restraining forces* are forces acting to restrain or decrease the *driving forces*. Field theory also explains the state of equilibrium between a system and its environment. An unequal balance of *driving forces* and *restraining forces* will cause instability and movement within the field until equilibrium is reached. Equilibrium (steady state) can only be reached if the strength of the *driving forces* is equal and opposite to the strength of the *restraining forces*, a necessary condition for stability.

Creating and sustaining change in an organization can only be accomplished if that organization successfully moves from point of equilibrium to another. This movement can be facilitated by changing individual attitudes and perceptions. Lewin's model for successful change has three sequential steps: *unfreezing*, *moving*, and *refreezing* (pp. 28-36). The process of *unfreezing* and *moving* to a new state is caused by loss of equilibrium due to changing *driving* and *restraining forces* within the force field. Once a new equilibrium is reached, and the force field is again in balance, the resulting stability will allow the system to *refreeze* in the altered state.

Redding and Catalanello (1994) state that the history of most organizations is characterized by "extended periods of equilibrium, punctuated by brief transitional states of transformation" (p. 48). They contend that organizations function for prolonged periods of time in relatively frozen states, in which fundamental norms and processes are left unchallenged and consequently unaltered. During these periods, changes are relatively small and non-controversial, usually resulting in more efficient processes or more effective operations. Fundamental change occurs only during relatively brief, but possibly turbulent, transitional periods when organizations are challenged by circumstances that demand they modify their basic ways of doing business. Innovation and change are "invariably associated with resistance and organizational politics" (Tushman & O'Reilly, 1997, p. 184).

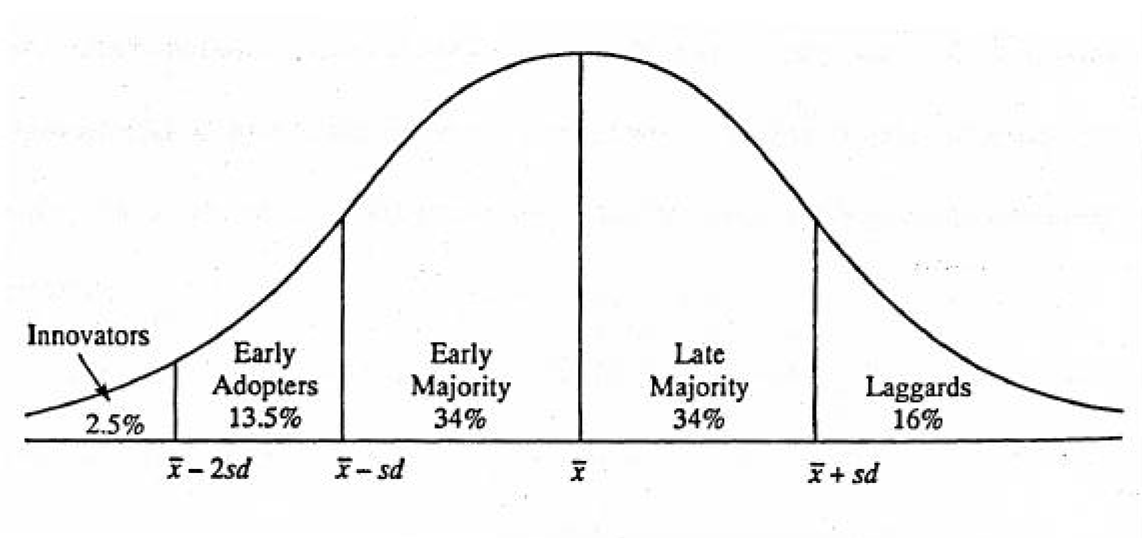
If the challenge is valid and important enough to demand serious consideration, the organization must *unfreeze* to allow an open exchange of ideas and some movement in response to the challenge. An important part of the *unfreezing* stage is the debate over fundamental questions about the soundness of organizational vision, purposes, processes, and structure. This type of self-evaluation may result in changes leading to a new, more successful state; however, these changes may not happen easily. Every organization operates with a prevailing set of assumptions, beliefs, and values. Since the existing paradigm led to success in the last frozen period, it will be psychologically entrenched into many organizational members, making *unfreezing* very difficult. Redding and Catalanello (1994) believe that only a critical challenge or crisis can successfully initiate a fundamental change (p. 49). Personal and organizational decisions to change are the catalysts for this process and the links between *unfreezing*, *moving*, and *refreezing*. Why these decisions are made and how they affect the parameters of the new equilibrium will determine the extent to which the innovation is understood, accepted, and adopted.

Instead of focusing on organizational and environmental characteristics of change, Havelock (1973), Rogers and Shoemaker (1971), and Rogers (1995), present a more practical viewpoint, with more emphasis on the individual adopter and the context of the change from the adopter's point of view. They focus on the decision process of the individual or system to adopt or reject an innovation and seek to identify adopter characteristics. Diffusion is the process by which innovation is accepted, spread, and integrated into the fabric of a social system. A social system's structure, with its culture, processes, and bureaucracy greatly influences its individual members. Traditional older systems are usually slow to change, whereas more modern systems may be more technologically developed and change oriented. The opinions and convictions of those in leadership roles affect individual attitudes and behavior, while change agents influence the direction of the innovation decision. Innovations can be adopted or rejected by individual members of a system or by the entire social system.

Rogers and Shoemaker (1971) describe the relationship between the social system and the individual in the following terms: *optional decisions*, *collective decisions*, and *authority decisions* (p. 36). *Optional decisions* are those made individually, regardless of the decisions of others. Even so, the individual's decision will be influenced by established norms and the need to conform to group pressures. Some examples of optional decisions are to start smoking, to stop drinking alcohol, or to stop arriving late to meetings. *Collective decisions* are those made by consensus within the social system, such as the decision of the courts to heavily penalize tobacco companies for increased smoking rated among adolescents. *Authority decisions* are those forced upon the system by those in positions of higher power. One example of an authority decision is curfew at a military base. The individual's attitude toward the innovation is not a prime factor in the adoption or rejection of an authority decision; he or she is simply told of and expected to comply with the innovation decision.

Rogers and Shoemaker (1971) differentiate five categories of adopters by their willingness to accept innovation: *innovators, early adopters, early majority, late majority,* and *laggards*. The more innovative adopters can accept new ideas readily and put them into practice at a quicker rate than less innovative adopters. *Innovators* are venturesome with an obsession for trying out new ideas. They are willing to take risks and accept occasional setbacks when deviating from the norm. *Early adopters* are usually the more traditional leaders in a social system and are generally more respected role models for organizational change. The *early majority* adopt new ideas just before the average member of an organization but are rarely in leadership positions. The early majority's unique position between the relatively early and relatively late to adopt make them an important link in the diffusion process and a key target for a change agent's attention. The *early majority*'s initial movement on an issue marks the start of an organizational shift. The *late majority* are more cautious and skeptical, not reacting until most others have done so. *Laggards* are the last to adopt innovation; they are very suspicious of change and grudgingly hang on to established values and traditions. Rogers and Shoemaker (1971) compared adopter group characteristics and found that relative early adopters tend to have more education, higher social status, and a greater ability to deal with abstraction than late adopters. Also, there was no consistent finding that age is a factor influencing innovativeness.

While examining adopter categories and innovation characteristics, Rogers (1995) concluded that innovation adoption usually follows the bell-shaped curve of a normal distribution when plotted over time on a frequency basis (p. 257). As seen in Figure 1, the mean (x) and the standard deviation (sd) are used to divide a normal distribution of adopters into categories. The mean represents the average time of adoption. This adopter classification is not symmetrical, since there are three adopter categories to left of the mean and only two to the right. Figure 1 shows that innovators make up about 2.5% of the people in an organization and are followed by the early adopters (13.5%) and the early majority (34%). The late adopters also make up 34% of these people and are followed by the last group to adopt, the laggards (16%).



<u>Figure 1.</u> **Adopter Categorization by Innovativeness** (from Rogers, 1995, p. 257)

(used with permission)

If the cumulative number of adopters is plotted over time, the result is an S-shaped curve as shown in Figure 2. An examination of this curve can help explain the adoption process. The initial portion of the curve rises very slowly at first, when there are relatively few adopters per time period. It then accelerates rapidly to a maximum rate until approximately half of the people have adopted. At this point the curve begins to slow down and flatten out as the late majority and laggards finally adopt.

Rogers (1995) conceptualized a five stage Innovation Decision Process Model, the mental process through which an individual passes from initial awareness of an innovation to social acceptance of the adoption (p. 161). The stages of the model are:

1. Knowledge - exposure and understanding

2. Persuasion - attitudinal position

3. Decision – adopt or reject

4. Implementation – putting into practice

5. Confirmation – reinforcement of precious decision.

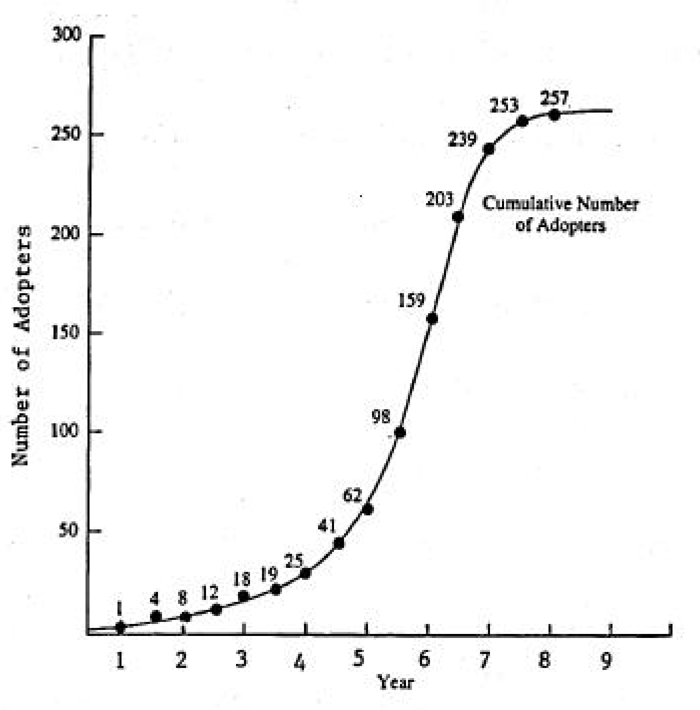


Figure 2. Cumulative Adopter S-Curve (from Rogers, 1995, p. 265)

(used with permission)

The length of time for the innovation decision period to reach its conclusion can vary considerably. This time period is determined by many complex factors such as the innovation itself, the type of innovation decision (optional, collective, or authority), social system characteristics, and individual adopter qualities. For example, innovations with certain characteristics are adopted more quickly and have a shorter innovation-decision period. These innovations tend to be relatively simple in nature, divisible for trial and experimentation, and compatible with previous experiences, social norms, and existing behaviors. Technology-based education and training is very complex and not compatible with the previous experience of most DSMC faculty; therefore, even though this innovation is being implemented with an *authority decision*, complete adoption could take many years.

Rogers (1995) also categorizes five characteristics of innovations that contribute to their eventual acceptance, implementation, and rate of adoption: *relative advantage, compatibility, complexity, trialability, and observability*. *Relative advantage* is defined as "the degree to which an innovation is perceived as better than the idea it supercedes" (p.212). This advantage can be defined either in objective or subjective terms, but the most important factor is the perception that the innovation is advantageous to the individual adopter or the adopting organization. *Compatibility* is "the degree to which an innovation is perceived as being consistent with existing values, past experiences, and the needs of potential adopters" (p. 224). The greater the relative advantage and compatibility of an innovation, the more rapid will be the rate of adoption. *Complexity*, on the other hand, is inversely related to rate of adoption. *Complexity* is "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 242); therefore, increased complexity leads to slower rates of adoption. *Trialability* is defined by Rogers (1995) as "the degree to which an innovation can be successfully experimented with on a limited basis" (p. 243). New ideas or methods can be introduced at a slow rate, or perhaps in segments, which can be evaluated piecemeal before a final decision is reached on the total package. *Observability* is "the degree to which the results of innovations are visible to others" (p. 244). If people can see the results of an innovation, they are more likely to accept the idea and adopt sooner. Trialability and observability are both positively related to adoption rates. These five characteristics will be evaluated relative to the innovation in this study, computer-based development and delivery of courses.

To examine innovation adoption at the individual level and from an organizational context may be helpful. In the innovation decision process, an individual must pass through a mental process starting with awareness (first knowledge) and ending with a decision to adopt or reject the innovation. The adopter can be viewed as an independent personality system or the organization as a social system. In either case the system confronted with an innovation is challenged to alter some structure or process in coping with a new situation (Rogers 1995). Additionally, this study uses the concept of planned change. Planned change originates with a decision to make a deliberate effort to improve the system, possibly with the help of an outside agent to assist in making the improvement. This external assistant is called a “change agent”, and the specific system (individual or organization) is called the “client system” (Lippitt, Watson, and Westley, 1958, p. 12).

When any system is confronted with innovation, three types of forces may be present: *change forces, resistance forces*, and *interference forces* (Lippitt, Watson, and Westley, 1958). *Change forces* originate in any aspect of the situation that increases the willingness of the client system to make the proposed change. *Resistance forces*, on the other hand, are always directed away from the change objective. There may also be other forces present that are not necessarily for or against the change but are better described as *interference forces*. These forces can hamper progress toward change indirectly as they compete for the resources (time, money, or manpower) needed to execute the change process (p. 89). Through analysis of the concerns of the DSMC faculty, this study will identify and characterize all three types of forces (change, resistance, and interference).

Havelock (1971) also conducted extensive research about change model development. He developed the concept of linkage between the social system (in which the change is taking place) and the resource system (which is providing the fuel for change). He also described three different models for understanding the change process: a) the Social Interaction Model, b) the Research, Development, and Diffusion Model, and c) the Problem Solving Model. Havelock’s Social Interaction Model emphasizes the understanding of the change process in terms of a series of decision phases through which the individual adopter moves, and how the innovation is diffused throughout a social system. This model attempts to explain the diffusion process in terms of adopter attitudes and innovation characteristics (Merz, 1996).

Hall and Hord (1987) divide the Social Interaction Model into five phases that typically characterize the innovation adoption process: *awareness*, *interest*, *evaluation*, *trial*, and *adoption*. The initial phase includes developing an *awareness* of the innovation. The next phase includes growth in *interest* and gathering additional information and knowledge about the innovation. The *evaluation* phase is next, where the decision is made to adopt the innovation. This phase is followed by the *trial* phase, which can involve piecemeal experimentation. The final phase is *adoption*, but, of course, rejection could stop the process at any point along the way. This model assumes that the innovation is fully developed, has value, and is ready for dissemination. The role of a change agent or facilitator is only significant in the early stages of this model, when the adopters are gaining awareness and interest. After the adoption decision is made, the change agent has a reduced role because the process has a natural tendency to build and sustain momentum. The five phases in the Social Interaction Model are very similar to Rogers' Innovation Decision Process Model.

Havelock's Research, Development, and Diffusion Model (1971) treats change as an orderly, planned sequence of events from problem identification to the development and diffusion of the solution. This model of change emphasizes the evolutionary nature of the scientific method of discovery. Five assumptions form the Research, Development, and Diffusion Model:

1. A rational sequence for evolving and applying a new practice includes research, development, packaging, and dissemination.

2. Extensive and lengthy planning is required.

3. The rational sequence and planning functions require many specialized skills and much coordination.

4. The adopter is a rational person, but only a passive consumer.

5. Expensive development costs are acceptable due to the long-term efficiency and life-cycle savings (Hall and Hord, 1987, p. 33).

This model puts little emphasis on the user, assuming that the innovation makes such technical and rational sense that the user will have little choice but to quickly accept and implement it.

Havelock's third perspective on change, the Problem Solving Model, focuses on the user much more and emphasizes group dynamics and human relations. The most important factor in this model is the consideration of user need, which should be the primary concern of the change agent. Establishing this requirement or diagnosing the user need is an integral part of this change process. The Problem Solving Model involves the users or adopters working together and with change agents throughout the innovation adoption process. Hall and Hord (1987) point out that for maximum success, change agents should not be directive or authoritative with users or advocate a particular solution. Instead, change agents should guide the users to select the best solution for their particular situation. Strongest user commitments can result from self-initiated, internally-sustained innovations.

The Problem Solving Model considers the adopters to be significant contributors throughout the innovation process, whereas the previous two Havelock models treat the adopters merely as passive followers in the change process. The goal of the Problem Solving Model is to develop internal problem solving capacity through collaboration with outside consultants (change agents) to increase team-building and process skills. These skills will enable and users to better analyze their own problems and generate alternative solutions. The most successful change agents will be ones who encourage and empower users to determine their own solutions and methods of implementation.

This section provided theory about the change process and introduced several change development models. The next section addresses the role of the change agent in the change process.

Change Agents

To view the change process from an operational perspective, Lippitt, Watson, and Westley (1958) introduce the relationship between the change agent and the client. They emphasize the role of the change agent, who must convince the clients that the innovation will have positive benefits to the client organization and its members. The change agent can help the client better understand the issues and the environment by offering an objective, independent assessment, which may help the client organization to appropriately realign its values, goals, and organizational structure as necessary. The change agent also encourages specific skills and strategies to solve problems presented either by the external environment or by interaction and behavior within the system (Merz, 1996).

Lippitt, Watson and Westley, (1958) develop a change model by adding several steps to Lewin’s three stage change model (unfreezing, moving, refeezing) to include the role of change agents. *Phase 1, Development of a need for change* is similar to Lewin's unfreezing stage and *Phase 2, Establishment of a change relationship* is the development of a working relationship between the change agent and the client system. *Phase 3, Working toward change* is Lewin's moving stage. This phase is subdivided into three parts: *3A, Clarification of the problem*; *3B, Establishing goals and actions*; 3C*, Transformation of intentions into change efforts*. *Phase 4, Generalization and stabilization of change* is Lewin's refreezing stage. *Phase 5, Achieving a terminal relationship* follows the decision to adopt and closes out the relationship between the change agent and the client organization. If the change has been successfully institutionalized into the organization, the change agent has no continuing purpose (pp. 130-143).

Havelock (1973) presents an educational change model, called The Stages of Planned Change, which is also centered around the relationship between the adopter and the change agent. This model characterizes six stages through which a change agent must move during the life-cycle of an innovation (pp.113-114). *Stage I: Relationship* includes developing a viable relationship with the client. *Stage II: Diagnosis* addresses problem assessment and problem definition. *Stage III: Acquiring Relevant Resources* deals with the acquisition of necessary manpower and material resources. *Stage IV: Choosing the Solution* involves finding the optimal solution to address the problem that is consistent with the client organization's needs and values. *Stage V: Gaining Acceptance* describes the period of implementation. *Stage VI: Stabilizing the Innovation and Generating Self-Renewal* develops methods to promote institutionalization of the innovation and also encourages clients to develop internal change agents to help institutionalize the change process within the client organization.

This section discussed the role of the change agent in the change process. The next section explores the origin of concerns-based theory and explains the relevance of the Concerns-Based Adoption Model to this study.

Concerns-Based Theory

Educational Innovation

Concerns-based theory and the innovation adoption process in educational institutions were primary factors in the development of the Concerns-Based Adoption Model (CBAM). Researchers at the Research and Development Center for Teacher Education (RDCTE) refined this model in the early 1970s in response to many failed educational innovations in the late 1950s and 1960s. The successful launch of Russian Sputnik I in 1957 was a pivotal event and raised immediate concern with possible deficiencies in the country's scientific and technical capabilities. In response to Sputnik, the U.S. Congress passed the National Defense Education Act of 1958 that supported several large scale curriculum development programs and led to a national curriculum movement in the 1960s. For example, with major support from the National Science Foundation, many revolutionary curricula were developed in mathematics and science.

The post-Sputnik crisis in the 1960s also resulted in the federal development of other large-scale curriculum innovations, such as new math, open education, individualized instruction, and radical revisions in chemistry and physics. Educators now call this decade the "adoption era" because of the preoccupation with the number of innovations attempted (Fullan, 1991, p. 6). The quantity of innovations became the mark of progress, without regard for the quality of the innovations. Many of these innovations lacked proper development and suffered from minimal resources and planning for implementation. The result was widespread failure in adoption and institutionalization of these educational innovations. The reaction to this situation was predictable, and by the early 1970s, educational innovation was a distasteful subject for local educators (Hall, 1992).

Another failure of the national curriculum development movement of the 1960s was the attempt to develop teacher-proof curricula. The intent was to develop curricula that would be so well defined that teachers would not adapt or alter the prescribed practices or methods. Since there was little federal influence and a general dislike and distrust of federal policy from classroom teachers, most of these curricula were never successfully adopted (Hall, 1992). According to Hall (1992), the gap between policy and practice causes the most serious problems in education because policy makers do not always comprehend the operational impact (to the classroom teachers and students) of the changes which they initiate.

According to Fullan (1991), educational reform continues to be a controversial political issue in the United States. He characterized the United States educational system as having "a huge legacy of negative reform that cannot be overcome simply through good intentions and powerful rhetoric" (p. 354). This problem can be addressed with a greater knowledge of the change process (understanding the concerns of educators) and a commitment to more efficient implementation of educational reform (adoption of educational innovations) at all levels. These two concepts are central to concerns-based theory.

Concerns of Educators

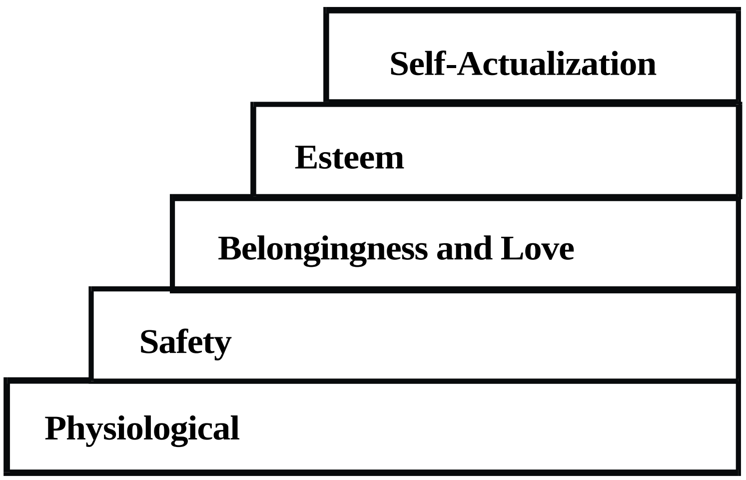
The early conceptualization of concerns theory in educational programs was the result of the pioneering research of Frances Fuller, a clinical psychologist. In the 1960s Fuller began research with students who were in teacher preparatory programs. Research data showed that people with different amounts of teaching experience have different kinds of concerns about teaching. Based on her clinical observations and results of earlier studies, Fuller (1969) originally conceptualized a two-stage model which differentiated concerns about benefit to "*self*" and benefit to "*pupils*" (p.220). "*Self*" concerns involve things like personal adequacy of controlling a class, knowledge of subject matter, and interaction with parents and principals. "*Pupil*" concerns focus on the learning and progress of the students (p. 221).

Fuller saw that these young pre-service teachers would developmentally move through these stages of concern in time as their experience and professional capability grew. She noted that pre-service teachers with little or no experience exhibited a higher degree of *self* concerns than did experienced teachers, while the experienced teachers were concerned about the students more than themselves (p. 213). With more experience and data, Fuller, Parsons, and Watkins (1973) revised the two-stage model to a three-stage model, as follows:

1. Stage 1: *Self* concerns (adequacy as a teacher)
2. Stage 2: *Task* concerns (teaching methods, teaching performance)
3. Stage 3: *Impact* concerns (pupil learning needs).

Later Fuller used this three-stage model to develop an individualized teacher education program. She stated: "Concerns about teaching are expressions of felt need which probably possess motivation for relevant learning. Consequently any regularities in the concerns of teachers are of interest to teacher educators. If motivation is to be harnessed for learning, curricula should consider the felt need or concerns of teachers" (Fuller, et al., 1973, p. 2). Fuller recognized that the developmental nature of a teacher's progression through the three stages of the model correspond to Maslow's hierarchy of needs (Maslow, 1970, pp. 35-47), as depicted in Figure 3.

Though all needs are always present to some degree, the physiological needs are shown at the top of the hierarchy because they tend to have the highest strength until somewhat satisfied. Once physiological needs are met, safety (or security) needs become predominant, and once safety needs are met, social needs will begin to demand more attention. This pattern is repeated as the developmental progression leads to self-actualization.



<u>Figure 3.</u> **Maslow's Basic Human Needs**

Maslow's (1970) concept of human needs helps us to better understand concerns-based theory because of the great similarity with Fuller's model. Fuller, Parsons, and Watkins (1973), hypothesized, as did Maslow, that all teachers will continually experience concerns in all three stages to some extent; however, the self concerns will be strongest with student teachers and relatively inexperienced teachers. Only when self concerns are adequately addressed can teachers begin to focus more on task concerns. As task concerns and self concerns subside, then teachers can give full attention to impact concerns and more focus on the students. The developmental nature of this process is a key part of concerns-based theory.

Concerns-Based Adoption Model (CBAM)

The educational experience of the 1960s clearly shows that the mere existence and availability of educational innovations does not ensure their use. At the RDCTE, Hall, Wallace, and Dossett (1973) examined the failure of educational innovations to achieve widespread adoption. One explanation was that innovation adoption was not understood to be a developmental process in which the concerns of individual adopters and the relationship of these concerns to organizational structure and support played a major role. They felt that the complexity of educational innovation coupled with the individual differences in each organization, classroom and teaching style was a large factor. Based on Fuller's original research (1969) on the change process for teachers and change theories by Lewin (1951), Rogers and Shoemaker (1971), Lippitt, Watson, and Westley, (1959), and Havelock (1971), Hall et al. (1973) characterized the process known as the Concerns-Based Adoption Model (CBAM).

CBAM evolved from Havelock's (1971) three perspectives on change (Merz, 1996). His Social Interaction Model explains innovation adoption in terms of group decisions within a social system, with the influence and assistance of a change agent. Havelock's Research, Development and Diffusion Model focuses on the rational development and dissemination of a solution to a technical problem, while his Problem Solving Model emphasizes the development of an organization's capability to solve its own problems. Havelock tried to capture the best features of these three change strategies into a linkage model, which stresses both the problem-solving skills of the user of an innovation and the establishment of collaborative relationships with external resource agencies to bring about necessary organizational changes. He used the linkage model to expand the capabilities of innovation adopters in an organization and to effectively use external resources and change agents for issue resolution (Hall and Hord, 1987).

CBAM uses all of Havelock's models but seems most directly related to the Research, Development, and Diffusion perspective where the emphasis is on the institutionalization of an innovation, that is, the introduction, adoption, and ultimate integration of an innovation into an organization's culture and daily practice. CBAM stresses user collaboration with a resource system, with an important focus on the individual capabilities of each adopter. CBAM assumes the existence of two primary systems (a user system and a resource system), and the temporary establishment of a third system, a collaborative adoption system (Hord, Rutherford, Huling-Austin, & Hall, 1987).

The resource system is the support mechanism within the organization where the innovation is taking place, and in most cases, the resource system represents the institutional leadership as the sponsor of the innovation. The resource system provides general organizational support for innovation adoption, including initial information, training, strategies, consultants, and change agents. The user system is the collection of individuals and groups who will all ultimately become users of the innovation upon adoption and institutionalization. To facilitate the change process, the innovation sponsor may establish a temporary collaborative adoption system. This system could be a consultant or other external agency which is tasked to facilitate the change process by providing initial awareness training and change agents for on-site assistance. The role of the consultant is to empower the user system with necessary knowledge, skills, and ability to effectively sustain the innovation. Therefore, the consultant, or change facilitator, provides necessary linkage between the resource system and the user system to ensure continued reciprocal feedback between these two. The goal of the sponsor should be to fully institutionalize the innovation with self-sustaining capability. At this time, the change agent is no longer necessary and can be phased out (Hord, Rutherford, Huling-Austin, & Hall, 1987).

The CBAM model is composed of three parts: *Stages of Concern*, *Levels of Use,* and *Innovation Configuration* (Hall, Wallace, and Dossett, 1973). *Stages of Concern* deals with expressed adopter concerns and issues related to his or her experience with, or perception of, the innovation. The purpose of this part is to analyze user feelings, observations, problems, successes, and failures while progressing through the change process of innovation adoption. This analysis should allow change facilitators and innovation sponsors to determine the readiness of user system personnel to embrace the innovation. The *Levels of Use* portion of CBAM relates to the amount of usage of an innovation throughout an organization, and *Innovation Configuration* documents changes and modifications of the innovation as it evolves throughout the adoption process and its entire life cycle. Since the innovation of technology-based education and training at DSMC was still in the very early stages, only the *Stages of Concern* part of CBAM was be used in this study. The *Levels of Concern* and *Innovation Configuration* parts of the CBAM model are candidates for future research with this innovation. A graphical representation of the CBAM model is shown in Figure 4. The model links the user system (the working level organization and its adopters) and the resource system using an external change agent.

CBAM assumes that a system of shared priorities and activities between the resource system and the users will promote acceptance and adoption of an innovation. CBAM is based on the theory that change is a developmental progression of events, many of which may be predictable (Merz, 1996). According to Hord, Rutherford, Huling-Austin, and Hall (1987), "A central and major premise of CBAM is that the single most important factor in any change process is the people who will be most affected by the change (the user system). Certainly, the innovation itself and the organization into which

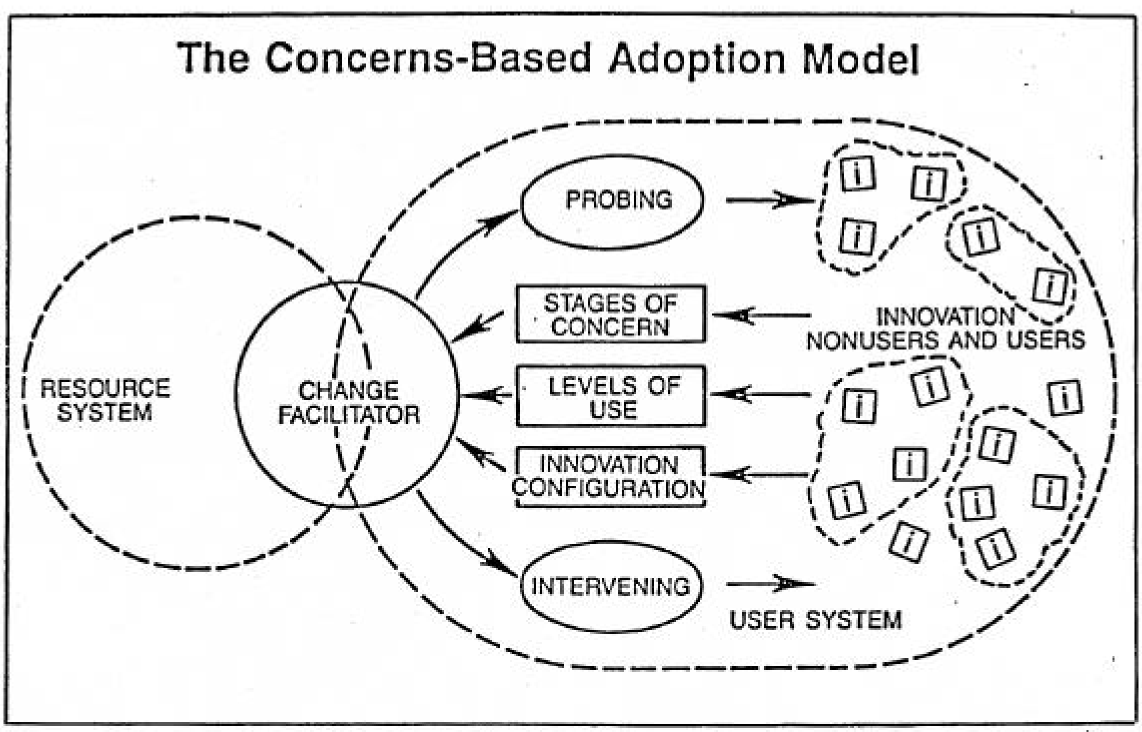


Figure 4. **CBAM** (from Hord, Rutherford, Huling-Austin, and Hall, 1987, p. 10)

(used with permission)

it is incorporated are important variables, but they are secondary to the people who are the intended innovation users" (p. 29). For innovations to be adopted, individuals must first change, then organizational change can follow. Only by understanding individual and organizational concerns and attitudes about the innovation can appropriate interventions be conceived and introduced. CBAM uses the concept of concerns to provide this insight, and Hall (1979) describes *concern* as "a composite description of the various motivations, perceptions, attitudes, feelings, and mental gyrations experienced by a person in relation to an innovation."

CBAM has seven Stages of Concern About the Innovation (Appendix D) that are summarized as follows (Hall and Hord, 1987, p. 60):

Stage 0, *Awareness*: the unrelated concern in which the individual expresses little concern or involvement with the innovation.

Stage 1, *Informational*: general awareness and interest in the innovation.

Stage 2, *Personal*: concerns about personal ability, demands, adequacy, and role.

Stage 3, *Management*: task concerns that include logistics and efficient use of resources.

Stage 4, *Consequence*: concerns related to student outcomes.

Stage 5, *Collaboration*: concerns about working with others to implement the innovation.

Stage 6, *Refocusing*: concerns about modifications to the innovation.

The stages in CBAM reflect Fuller's model in the following manner. Stage 0, 1, and 2 concerns are similar to Fuller's *self* concerns and Stage 3 (Management) concerns correspond to Fuller's *task* concerns. Lastly, Stages 4, 5, and 6 make up Fuller's *impact* concerns. The RDTCE research team successfully "verified a number of assumptions about change that were the basis of a model upon which our research was founded" (Hord, Rutherford, Huling-Austin, and Hall, 1987, p. 5). This model, the Concerns-Based Adoption Model, helped researchers arrive at several important conclusions that have helped to understand the process of educational change. These six basic conclusions were summarized from Hord, et al. (1987, pp. 5-6):

1. Change should be characterized as a process, not an event. Simply mandating that a change will happen, and handing out materials will not institutionalize the result.

2. Change is accomplished by individuals, not organizations. Therefore, individual users demand the attention of change sponsors and change agents.

3. Change is a highly personal and highly individual experience. Each individual may react differently to change; therefore, several intervention strategies may be required.

4. Change involves developmental growth as individual users increase skill levels with experience. New skills and abilities will generate more mature attitudes and feelings about the innovation.

5. Change is best understood in operational terms that relate to daily practice. Change agents will generate less resistance by communicating in concrete, practical terms.

6. *The focus of facilitation should be on individuals, innovations, and the user environment, instead of material or physical components. Only people can make change happen, and they do it by altering behavior.*

Since its development in the early 1970s, the CBAM model has been used successfully to identify concerns, primarily in educational settings, from elementary schools to universities. The literature identifies three specific uses of the SoCQ within the Department of Defense. The subject of the first (Barucky, 1984) was professional leadership development and the target population was a group of United States Air Force (USAF) officers and cadets from the Air Force Academy. Barucky's (1984) research demonstrated the use of concerns-based theory and the SoCQ with leadership training programs in the USAF. He concluded that concerns theory was "applicable to the realm of leadership training" and that the SoCQ was "a viable instrument for measuring these concerns" (p. 161). Barucky's results showed that those with little leadership experience had a higher relative intensity of early concern stages, and that those concerns decreased among groups with greater experience. He also found a similar relationship when comparing officer rank subgroups. Officers with less commissioned experience had higher relative intensity of early concern stages, and these scores decreased with more senior officers.

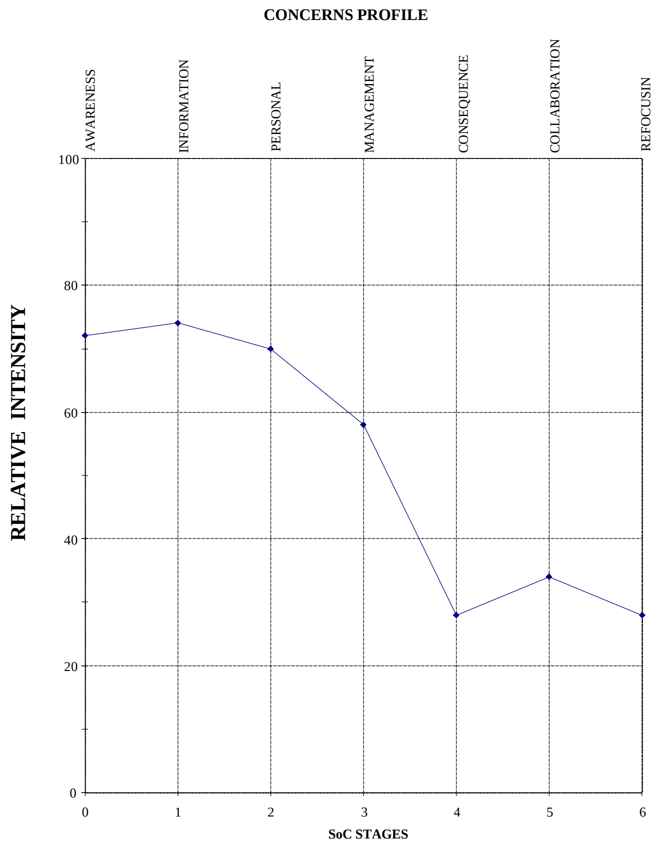
The second documented use of the Concerns-Based Adoption Model in the Department of Defense was a study by Bernier (1990) which addressed concerns of commissioned officers in the United States Marine Corps (USMC) regarding professional military education programs. Building on Barucky's research, Bernier also applied concerns theory and the SoCQ to a population of USMC officers from every rank from Second Lieutenant to Brigadier General. Bernier's findings showed that the SoCQ successfully measured the concerns of Marine officers and that those concerns about professional military education did vary with experience levels among officer subgroups.

Merz (1996) study is the third documented use of concerns theory and the SoCQ with a population in the Department of Defense. Merz used the SoCQ to identify Stages of Concern among civilian managers of the Defense Finance and Accounting Service. The innovation studied in this research was the transition from traditional training methods to satellite delivery systems. Merz categorized the Stages of Concern of civilian manager subgroups from five regional centers and demonstrated the utility of the SoCQ instrument to this population of civilians working in the Department of Defense. Her results showed a typical nonuser profile with peaked Stage 5 (Management) concerns, indicative of those in leadership positions (Hall, Wallace, and Dossett, 1973). She also found similar concerns from managers at each center and no relationship between the highest Stage of Concern and most demographic variables (like years of federal employment or experience in a particular career field). Merz used correlational analysis to find a relationship between the highest Stage of Concern and the number of courses completed by satellite. Merz successfully used results from these data to make specific recommendations to DFAS leadership regarding interventions in the change process toward adoption of satellite training.

This section introduced the concepts of concerns-based theory and the development of the Concerns-Based Adoption Model. The following two sections focus on the interpretation of concerns and general management strategies (interventions) for addressing concerns.

Interpretation of Concerns

Data from the results of an individual's SoCQ yield a concerns profile. Since change is a developmental process, the concerns of any one individual adopter (user) about an innovation will not be static; instead, they will shift in time (assuming continued use of the innovation). For example, a concerns profile such as that shown in Figure 5 is representative of a nonuser or very early user. This profile depicts an interested educator who is somewhat aware of and concerned about the innovation. This person has greatest concerns at Stage 1 (Information) and Stage 2 (Personal), indicating a need for more knowledge about the innovation itself and about the personal impacts this innovation will have. This person does not have a great deal of Management (Stage 3) concern and is even less concerned about the consequences of the innovation for the students (Stage 4) or how the faculty and students will use or modify the innovation on the future (Stages 5 and 6).



<u>Figure 5.</u> Typical Stages of Concern Profile of an early user

As this individual becomes a more experienced user with this innovation over time, the resultant concerns profile is expected to look something like that shown in Figure 6. In this hypothetical case, the user has relatively low early stage concerns (still with a relatively high Information stage) and much higher late stage concerns. This user shows highest concern for how the innovation is affecting students (Consequence stage) with relative low intensity of Stage 2 and 3 concerns, suggesting that this person feels secure in using this innovation. Concerns will most probably develop in a “wave pattern” and move from left to right as experience with the innovation increases (Hord, et al., 1987, p. 32). Self concerns will be most intense early in the change process and decrease with time, and Task or Management concerns will increase. Only after Management concerns have been reduced in relative intensity can Impact concerns be expected to intensify.

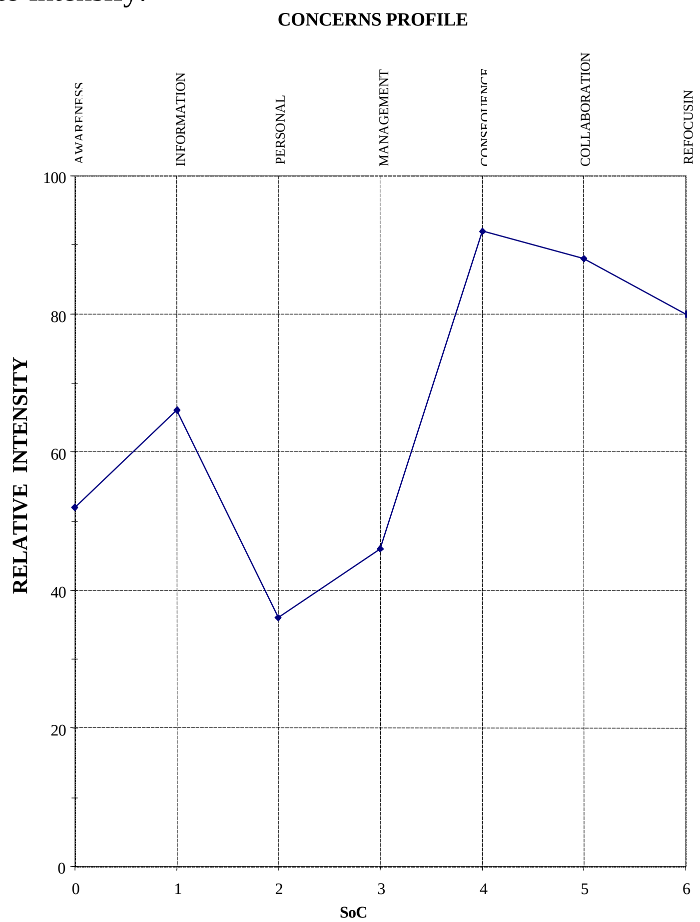


Figure 6. **Typical Stages of Concern Profile of a mature user**

Interpreting and understanding the concerns of users can be a highly effective guide to actions that supervisors or administrators might take to facilitate the implementation of change. Nothing is inherently good or bad about any particular stage of concern or concerns profile. Of ultimate interest to management are the underlying causes of concern and finding appropriate interventions to deal with the situation (Hall, George & Rutherford, 1986, p. 57). In this study, an open-ended question on the Stages of Concern Questionnaire (SoCQ) was used to attempt to discover these underlying causes by asking respondents to explain their major concerns about the innovation. The SoCQ provides a set of concerns profiles for one particular time in the life-cycle of an innovation. User concerns are dynamic and are expected to shift in intensity and in relation to each other over time as the innovation matures. According to Hord et al. (1987), "The developmental and relational nature of concerns is real and must not be ignored" (p. 43). Successful implementation of innovation and movement through the stages of concern cannot be forced, but with appropriate intervention, support and assistance, it can be aided.

General Strategies for Intervention

According to Hall and Loucks (1978), identification of educator's concerns will ease the problem of diagnosing group and individual needs during facilitization of the innovation adoption process. Data collected from various research studies at RDCTE showed that nonusers and early users of an innovation have their most intense concerns in Stage 0, *Awareness,* Stage 1, *Informational*, and Stage 2, *Personal*. The researcher anticipated this would also be true of DSMC faculty concerning the innovation of technology-based education and training. Nonusers are most concerned about having general descriptive information about the innovation and about the personal implications of the innovation. Correspondingly, they are not as concerned, relatively speaking, about the innovation's impact upon students (lower relative intensity in Stages 4, 5 and 6).

Management should provide intervention activities that address these initial informational needs and personal concerns, perhaps by providing complete general descriptive information about the innovation, and by describing how the innovation will affect users personally. For example, potential users should be told specifically how much time the innovation will take from their day, the implementation schedule, and what new knowledge, skills, and abilities will be required. Also, a training plan should be defined to address these new requirements. Hall and Loucks (1978) stress that management should not attempt to address higher stage concerns too early by proclaiming that this change will be good for the students or beneficial to the institution. This type of statement shows a lack of awareness from management of faculty concerns, and may actually arouse additional Stage 1 and 2 (*Informational* and *Personal)* concerns instead of facilitating the desired acceptance and positive response. Hall (1979) provides potential management intervention activities to address each Stage of Concern. These activities are summarized in Table 1.

Table 1

Potential Intervention Activities for Management

Stage of Concern	Management Activity
Stage 0, Awareness	1. Acknowledge that some concern about the innovation is legitimate and appropriate. 2. Share information about the innovation to arouse interest. 3. Decree that adopting the innovation is required. 4. Encourage internal communication about the innovation.
Stage 1, Informational	1. Provide organizational briefings and short media presentations. 2. Explain individual responsibilities. 3. State realistic expectations about benefits & risks 4. Clearly communicate specific goals of the innovation.
Stage 2, Personal	1. Clarify knowledge, skill, and ability requirements. 2. Provide training opportunities to meet these requirements. 3. Explain how innovation relates to other priorities. 4. Use change facilitators for personal support.
Stage 3, Management	1. Sponsor "how-to" workshops. 2. Show how innovation can be coordinated with other activities. 3. Establish consulting relationships.
Stage 4, Consequence	1. Provide encouragement and reinforcement regularly. 2. Keep communication open through all channels. 3. Send users to conferences/workshops.
Stage 5, Collaboration	1. Bring in OD expert to facilitate collaborative awareness. 2. Create opportunities for Stage 5 persons to work with others.
Stage 6, Refocusing	1. Help focus energy into productive directions. 2. Provide access to other materials

The previous sections have focused on the interpretations of concerns and provided general intervention strategies for innovation adoption. Next, this study examines concerns about the use of technology in higher education.

Technology in Higher Education

To place the use of technology in the DSMC curriculum into proper perspective, this study examined the infusion of educational technology into several institutions of higher learning in the Washington, D.C., area. This research was primarily centered around the needs for faculty development and the use of various technology methods. This study examines faculty incentives to use more technology as well as the barriers to this use.

Virginia Polytechnic Institute and State University

Perhaps the best example of technology use in this region, if not the entire country, is the Faculty Development Institute at Virginia Polytechnic Institute and State University (Virginia Tech). The Faculty Development Institute, one part of the Instructional Development Initiative at Virginia Tech, uses a long-term strategy to provide faculty the ability to use instructional technologies to enhance courses and teaching materials (Virginia Polytechnic Institute and State University Report, 1997). The other parts of the Instructional Development Initiative focus on classroom upgrades, computer labs, and infrastructure support.

Virginia Tech's Instructional Development Initiative began in 1993 as a result of that university reordering its priorities to put more emphasis on undergraduate classroom teaching. Research has long had major emphasis at Virginia Tech, but in the early 1990s the faculty incentives to enhance classroom teaching skills did not match the incentives to perform high quality research. The morale among teaching faculty was very poor in 1993 as budget cuts reduced teaching faculty and staff positions, but major research positions were unaffected. At the same time, national and state movements in higher education put more emphasis on undergraduate instruction because at many research universities, classroom teaching was no longer a high priority (personal communication with Dr. John F. Moore, Director of Educational Technologies, Virginia Tech, January 11, 1998).

To address this issue at Virginia Tech, the Chief, Information Systems Division, proposed a plan to both the President and Provost in the Fall of 1992. Both supported this concept, called the Instructional Development Initiative, and approved initial funding for the project. The effort was implemented quickly and pilot courses began in April 1993. The Faculty Development Institute, a cornerstone of the Instructional Development Initiative, has been a tremendous success and was able to reach 95% of the faculty in four years. In 1997, the Faculty Development Institute received the Theodore M. Hesberg Certificate of Excellence for "Faculty Development to Enhance Undergraduate Teaching and Learning" (TIAA-CREF Hesberg Award Report, 1977).

Before the Instructional Development Initiative began, Virginia Tech's engineering and science courses used computers and technology innovations extensively; other areas at the university did not. In the mid-1980s, the College of Engineering at Virginia Tech was one of the first in the country to require all students to own individual computers and to require that assignments and projects be completed using a computer. However, a great disparity existed between the engineering courses and core courses like English, Humanities, and Mathematics. The primary reason for this disparity was that the majority of research money at Virginia Tech went into its engineering and science projects. Those departments purchased state-of-the-art computers and associated technologies for research purposes. Other departments were less fortunate and only had minimal resources, if any, for technology upgrades.

In 1993, the Faculty Development Institute began to improve this situation by working with 50 faculty members from the College of Arts and Sciences in a pilot program. The goal of this four-day workshop was to improve teaching methods and student learning by introducing advanced technologies into the curriculum. The Dean of the College of Arts and Sciences assigned the best teaching faculty - not necessarily the most computer literate faculty - to participate in this program. As an incentive, each faculty member received a $1000 stipend, a new high-quality personal computer system, and an Ethernet connection. Encouraged by the results of this pilot program, the Faculty Development Institute has been conducting workshops since that time. These faculty workshops, planned by a committee of representatives from various academic departments, were responsive to faculty needs at all levels. In response to faculty recommendations for workshop topics, the content and context of these workshops have evolved continuously.

Following the pilot program, faculty were no longer paid a stipend to attend, but they continue to be rewarded for participation with new office computers, software upgrades, and network connections (*Chronicle of Higher Education*, February 6, 1998, p. A21). Some faculty complained about the excessive time required to learn new technologies, especially with no compensation or reduction in other assigned duties, but nearly all have completed the training anyway. The high number of completed courses could be a result of peer pressure, since the Dean of the College of Arts and Sciences selected his most respected faculty as the original 50 to initiate the pilot program. This first group did very well and spread positive feedback to their colleagues.

Since most faculty have now completed the initial Faculty Development Institute training, workshops have expanded beyond basic classroom presentation skills using technology to many advanced topics. The institute offers four-day workshops in the summer for new faculty along with many half-day seminars throughout the year to meet the continuing education needs of all faculty. The Faculty Development Institute has become so popular that Virginia Tech has begun to sell seats at workshops to other state institutions as they become available. Virginia Tech faculty still attend all these sessions on their own time (without compensation) but continue to receive new computers and software as the primary incentives for the longer summer workshops. This process helps the Information Systems Division reach its technology modernization goal of replacing each faculty computer every four years.

Before the Faculty Development Institute was established, few faculty used technology methods in their courses. Outside of the science and engineering courses, the use of educational technologies was a “fringe thing, certainly not mainstream” (Moore, 1998). The Faculty Development Institute has dramatically improved this situation with strong endorsement and sponsorship from top leadership and the use of faculty incentives. The basic premise of the Faculty Development Institute is that the faculty must have motivation, time, and resources to successfully implement new technologies and teaching methods. The incentive programs provided the necessary motivation.

Radford University

From the perspective of a small liberal arts university, Radford University presents a different view of educational technology. Radford is not a research university and has only several graduate degree programs; therefore, research grants do not provide much revenue for technology upgrades. In the early1990s, the Virginia General Assembly sponsored the New College of Global Studies at George Mason University, James Madison University, Old Dominion University, and Radford University. The goal of this program was to improve undergraduate teaching and learning by introducing new technologies into courses. With support from the New

College of Global Studies, Radford University purchased much-needed new hardware and initiated limited formal faculty training.

Unfortunately, state budget cuts in education eliminated this program in December 1994. However, for 1996 and 1997, Virginia funded a technology initiative to encourage the use of educational technologies in institutions of higher learning. This initiative totaled about $105 million, of which Radford's share has been approximately $1.5 million per year (personal communication, Dr. John Bryan, Director of Information Technology, Radford University, January 10, 1998). Radford spends a similar amount of its own funds on technology upgrades, at the expense of other services and supplies. Radford's goal is to invest these resources in technology (hardware and software) and training, including the replacement of 20% of the computers on campus every year (personal communication, Dr. John Bryan, January 10, 1998).

Radford does offer technology training courses to its 300 faculty members, but without incentives, except for the faculty's own personal desires to enhance teaching ability and professional status. Radford's leadership expects that the individual motivation will keep faculty coming to training sessions. Since they are so busy with other required duties and tasks, most faculty complain of insufficient time to take full advantage of these opportunities. The normal faculty load is four courses per semester, committee work, and publications, leaving little time for anything else. Radford offers formal technology training for faculty between Spring and Summer Semesters over a two-week period. Faculty can make specific recommendations for topics to be included in these training sessions.

The Information Technology Department manages these training sessions, but faculty must attend on their own time without compensation. With the lack of strong support and endorsement from the leadership at Radford, only about 25% of faculty have attended these sessions. Dr. John Bryan, Director of Information Technology, suggested that one way to increase interest and participation is to allow faculty "release time" to learn computer-based technology and multi-media methods for course delivery (personal communication, January 10, 1998). The administration has not offered faculty release time for this purpose, and faculty development technology training at Radford continues to be conducted on an individual basis.

Emergency Management Institute

The Emergency Management Institute (EMI) of the Federal Emergency Management Agency is an educational institution in the Federal Government which is beginning to offer courses using advanced technology methods, computer-based course delivery and distance learning. Their primary objective is to save money and time by eliminating the student travel time and travel costs associated with resident courses at the EMI headquarters at Emmitsburg, MD. Instead of training its own faculty to develop and deliver courses using computer technology, the EMI decided to outsource the entire effort (personal communication, Dennis Hickithier, Educational Technologist, Emergency Management Institute, January 13, 1998). The Institute hired a contractor to develop several courses using technology methods for distance learning and gave the contractor the responsibility of delivering the course.

The first course delivered in a computer-based format, Instructional Design for Master Trainers, was originally a 40-hour resident course. The computer-based version of the course was designed for completion in about 10 weeks with each student spending about four hours per week on-line, and two hours per week doing individual work assignments off-line. The initial offering in January 1998 was unsuccessful because most of the 12 students had some trouble adapting to the technology. For example, two synchronous chats were scheduled but never happened for several reasons. The most compelling reason was incompatible technology, from modems to phone connections and network servers. Five of the 12 students were never able to connect to the live chats, and each time one was scheduled at least three students were out of town on disaster duty with no access to a computer. One additional problem was a very detailed schedule with several inconsistencies, causing three students confusion about the flow of the course and the student requirements. In addition to the goal of saving money and time, the EMI also expected no degradation in quality of the technology-based course when compared to the resident classroom course. Degradation clearly occurred. The Emergency Management Institute is now reassessing the course format and delivery methods, as well as the contractor's performance (personal communication, Dennis Hickithier, January 13, 1998).

Catholic University of America

The experience of Catholic University of America provides an example of a private, liberal arts university which is in the early stages of integrating computer technology into its curriculum. Only about 20% of the students at Catholic have their own personal computers, and only about 60% of faculty have computers in their offices. (personal communication, Dr. Bill Lantry, Director of Academic Computing, February 24, 1998). The use of computer technology in the classrooms and in courses is small, but growing rapidly, with each academic department setting its own standards. As reported by the *Washington Post* (Wheeler, L., March 18, 1998, p. B8), Catholic University of America has nearly completed a $3.5 Million project to wire all 60 academic buildings and dormitories for computers. Dr. Lantry reported that about 75% of the buildings are fully networked now (personal communication, February 24, 1998).

The Academic Computing Center has a development laboratory in its main building and will soon have six smaller computer laboratories spread throughout campus. The main laboratory has two full-time staff assistants for faculty support; and the other six laboratories will be manned by student assistants. Faculty can request support and services from the Academic Computing Center as they integrate computer technology into their courses. Even though Catholic University has no stated goals regarding the use of technology in the curriculum, the Director of Academic Computing has taken a proactive approach by requesting mini-grants for faculty training during the summer. Each mini-grant consists of $2000 for 2 weeks of technology familiarization with the goal of inserting technology into the curriculum as appropriate. The possibility of summer grants has increased faculty enthusiasm about technology training. Until now, training has been done during the academic semester while faculty members were fully occupied with other duties and responsibilities. Most faculty felt that they were too busy to attend these training sessions, and since incentives to do so (other than personal growth) were few, attendance has been low (personal communication, Dr. Bill Lantry, February 24, 1998).

George Mason University

George Mason University (GMU) uses a comprehensive system of educational technologies within its urban campus. It has no over-arching policy covering the use of educational technologies, but the academic departments use technology extensively. A high-level task force is now looking into policy issues on distance learning and educational technologies (personal communication, Dr. John O'Connor, Chairman, Academic Computing Department, February 23, 1998). The large number of non-resident students (commuters) is a problem for the university, because they typically do not have access to university networks or computer laboratories during evenings or weekends. The policy task force will attempt to address the needs of commuter students.

As GMU puts more technology into its courses, it is beginning to face issues of computer literacy requirements as prerequisites for certain technology-based courses. Students are presently required to become certified in these five areas of technology expertise during their first year: word processing, spread sheets, internet-based research, data bases, and presentations. All GMU courses requiring proficiency in any of these five areas will list these areas as entry requirements with the registrar. Students will be unable to register for these courses until their certification is on file at the main library which conducts certification training in all five areas. This process ensures a minimum level of student competency in the required technology areas.

GMU faculty use the Instructional Resource Center and Educational Technology Laboratory, a large well-staffed modern facility, for assistance with technology insertion into the curriculum. Dr. O'Connor (February 23,1998) expressed concern that even though this laboratory was being used and was in high demand, the majority of faculty did not use it. His assessment, based on discussions with department chairs and faculty, was that many faculty members thought they were far too busy to commit the required time to learn something new. Faculty members feel that their schedules are already too full, and putting technology into their courses was not a high priority. Virtually all faculty have computers in their offices and the policy at GMU is to replace computers on a four-year cycle to prevent obsolescence. Therefore, the resources are in place, but many faculty are not taking full advantage of the opportunities to integrate technologies into their courses. George Mason has had most success motivating faculty to introduce computer-based technologies by using three methods: release time, summer stipends, and travel grants (personal communication, Dr. John O'Connor, February 23, 1998).

American University

American University, a private institution in Washington, D.C., is making great strides toward the use of educational technologies in its courses. Strong institutional support for increased use of technology by faculty and students is present, but no specific goals are established (personal communication, Dr. Greg Welsh, Director of Academic Computing, February 23, 1998). Four academic areas use technology extensively in the curriculum now: business, computer science, information systems, and languages. The Center for Teaching Excellence, a large state-of-the-art laboratory dedicated to helping faculty improve teaching methodologies with technology, is in use most of the time. There are also five computer laboratories throughout the campus that are available to faculty and students, but technical services are the limiting factor. The technical staff is not large enough to meet the demands of faculty and students. The Director of Academic Computing has submitted a $300,000 proposal to expand the Center for Teaching Excellence this year with additional hardware, software, and much staff support (personal communication, Dr. Greg Welsh, February 23, 1998). Dr. Welsh is also working with the Provost and Deans to establish a strategic plan for Information Technology.

American University requires modern computer laboratories to attract and recruit the type of students it needs. Although there is no requirement to have a computer on campus, approximately 75% of the American University students do have them. Also, about 50% of potential recruits have computers with internet access as high school students. Therefore, officials at American University feel that upgrading computer laboratories and infusing technology into courses is absolutely essential to maintain student enrollment. Officials also feel that the high tuition rates at American University, approximately $30,000 per year, require that students have the best information resources and technology available (personal communication, Dr. Greg Welsh, February 23, 1998).

Realizing the importance of information technology, the Provost and Deans at American University are developing a system to reward faculty members with exceptional abilities and expertise in the use of educational technologies and computer-based courseware. The first step will be to make technology expertise and computer-based course development important factors in tenure or pay raise decisions. The Provost is now urging rank and tenure committees to consider a faculty member’s ability to use educational technologies. In the near future, a new position will be added to the faculty with the equivalent of Dean status and will be titled either Director, Information Technology or Director, Center for Teaching Excellence. The unmistakable trend at American University is to establish clear faculty incentives to use educational technologies by using abilities in this area as factors in promotion, tenure, and pay (personal communication, Dr. Greg Welsh, February 23, 1998).

University of Maryland, University College

The University of Maryland, University College (UMUC) is well known for its distance learning impact all over the world and is now moving more and more of its courses to a web-based format. UMUC's distance education program now offers 13 bachelor's degrees that can be earned entirely through distance education courses "without setting foot in a classroom" (*The Washington Post*, April 29, 1998, p. A9). To accommodate this type of program, the institutional structure of UMUC is much different than the traditional college or university. Except for a small administrative staff, most professors are part-time adjunct faculty. Without the expense of a large full-time faculty, UMUC can keep a large support staff to conduct daily operations. In addition to other functional support areas, this staff includes about 30 educational technologists and instructional designers to assist in developing technology-based courses. Even with 30 designers, developing each course for distance learning with technology applications can take about one year at UMUC, and that amount of time is a conservative estimate. Institutions where faculty must design and develop technology courses without this degree of assistance can expect the process to take significantly longer, especially if that faculty must also continue to teach classroom courses as they are developing computer-based courses (personal communication, Dr. Kimberly Kelly, Research Librarian, UMUC, March 5, 1998).

The presence of adjunct faculty at UMUC greatly simplifies the issue of faculty incentives for the using educational technology. Since there is an abundant supply of qualified adjunct professors in the Washington, D.C., area who are seeking courses to teach, UMUC simply informs potential faculty applicants that a particular course will be taught using a certain technology. Faculty must obtain certification from UMUC that they are qualified in using the appropriate technology methods before they will be assigned to teach that course.

UMUC offers training courses to prospective faculty with assignments that will demonstrate required knowledge, skills, and abilities. When the training courses are successfully completed, UMUC certifies the instructor for using that technology. If the prospective faculty member does not complete requirements for certification, then that person drops off the qualified list of adjunct faculty (personal communication, Dr. Cathlene Williams, Adjunct Professor, UMUC, January 28, 1998). Consequently, at UMUC the incentive for faculty to use educational technologies is very basic and straightforward: if a prospective faculty member is not proficient and certified in the use of a required technology, then another qualified adjunct faculty member will be hired.

The George Washington University

George Washington University, a private institution in Washington, D.C., is an example of a university in the early stages of using educational technologies and distance education. In the absence of institutional policy and support, the university has made good, but isolated progress in merging technologies into courses. Unfortunately, each academic department handles this effort independently without faculty incentives in place. Consequently, the few success stories are credited to individual faculty members' motivation, desire, and capability. The Council of Deans at George Washington University has noticed these successes and is now investigating policy decisions regarding faculty compensation and other incentives to use technology more. Among the potential incentives are release time, stipends for on-site training, and research grants for course development using educational technology. On the other hand, the most common faculty issues concerning the use of educational technologies are the lack of formal support and endorsement from university officials and the lack of time to develop personal skills using technology (personal communication, Dr. Mary Anne Saunders, Director, Center for Professional Development, The George Washington University, February 24, 1998).

Mary Washington College

Mary Washington College, a small state school in Fredericksburg, VA, is aggressively inserting technology into its courses. Every new student is expected to be proficient is using the basic suite of technology areas offered on campus. Students must successfully demonstrate proficiency skills in these five areas: electronic mail, internet searches, library resources, word processing, and basic computer skills. Most upper level courses and many other courses require some or all of these skills as prerequisites. In 1995, Mary Washington College initiated an $8.6 million upgrade to improve the academic computing infrastructure. All dormitory rooms have been equipped with ethernet connections with video capability, and each of the five main academic buildings have fully-staffed computer laboratories (personal communication, Dr. Dave Ayersman, Director, Learning Technologies Department, Mary Washington College, February 10, 1998).

The Learning Technologies Department at Mary Washington College provides technology training in monthly workshops for faculty in the Faculty Development Laboratory. Even though all departments are encouraged to use more technologies in their courses and there has generally been good progress in this area, only about 40% of faculty have become involved. Incentives are available to faculty in the form of annual grants, new equipment, and stipends. Also, each academic department has $1500 in discretionary funds available for technology investment. Even though the faculty is generally willing to learn to use new technology and resources are available to them, many still don't participate. The primary reason is lack of time in the faculty's busy academic schedule (personal communication, Dr. Dave Ayersman, February 10, 1998).

Summary

This chapter explored the fundamental change theories upon which the Concerns-Based Adoption Model (CBAM) was developed. Various change models that have influenced the formulation of concerns-based research at the Research and Development Center for Teacher Education at the University of Texas-Austin were examined. Then the Stages of Concern concept, the fundamental part of the CBAM model for this study, was introduced. The Stages of Concern portion of the CBAM model will be used to characterize the thoughts, feelings and perceptions of DSMC faculty in response to an imminent major innovation. These concerns will identify the need for interventions to facilitate the change process to technology-based education. The final section of Chapter II provided a trend analysis of the use of technology in higher education, which was extremely useful in formulating the recommended intervention strategies for DSMC.

This study explored the use of educational technologies at small and large state universities, private institutions, and a government organization. Several themes have emerged. While education and training managers do realize the need to integrate technologies into their programs, most are doing so in a fragmented manner. In most organizations, the efforts to introduce technology into courses are not centrally funded and managed because, in most cases, no dedicated budget or plan exists. Generally, faculty support the idea of a more technologically modern curriculum, but most individual faculty members must create and employ these technologies in their courses themselves.

This study has found that many faculty members are not taking advantage of the technologies available to them, and there seem to be two major reasons: **lack of time** and **lack of motivation**. Faculty will assert that they are not anti-technology, but that they are not given adequate time or incentive to accomplish this difficult task. Basically, faculty believe they are expected to learn new educational technologies and to develop these methods into their courses in addition to completing all other assigned duties. On the other hand, it seems that **lack of time** is probably due in large part to **lack of motivation**. There would probably be much more motivation to integrate technology if faculty truly believed this expertise would make their courses better and enhance their professional status, reputation, self-esteem, or pay. Increasing motivation would alleviate the "lack of time" problem, because technology integration would quickly assume a position of higher priority to faculty.

Because of the lack of institutional support and adequate incentives, faculty tend to concentrate on their traditional duties and do not extend themselves into new areas. Current management approaches have not been completely successful because learning and employing new technologies is not a simple proposition. This process is time-consuming and requires proper training and resources. Until management provides faculty with appropriate incentives, time, and resources, technology will probably continue to be implemented on a case-by-case basis with the early adopters slowly leading the way. Next, Chapter III describes the research design, research methods, and analyses that were used during this study. The procedures used to address each research question are also explained.

CHAPTER III

METHOD

Introduction

This chapter describes the research methods, procedures, and data analyses that were used during this study. The purposes of this study were to identify the Stages of Concern of the faculty at DSMC toward technology-based education and training, and to determine appropriate intervention strategies to assist DSMC through this change. The survey instrument used, the Stages of Concern Questionnaire (SoCQ), was also defined, with an explanation of how it was used to address the research questions, and how data from this survey instrument was analyzed in regard to the innovation adoption process at DSMC. The reliability and validity of the SoCQ is discussed, as well as the procedures used to administer this survey. Data processing procedures and appropriate analysis methods were described for each research question.

Research Design

This study used a survey research design to explore the concerns of professors at the Defense Systems Management College about technology-based education and training. The SoCQ is a quick-scoring paper and pencil instrument developed and tested over a number of years by the researchers at the Research and Development Center for Teacher Education (RDCTE). Developed and used primarily in educational settings, this instrument also has been successful in industry and military applications. In addition to the quantitative assessment of survey questions, a qualitative assessment of responses to open-ended questions on the survey was accomplished. Finally, site visits to several independent academic institutions in similar states of transition provided additional supporting data used in the qualitative evaluation of this study. Results of the site visits were compared to the qualitative and quantitative analyses of DSMC faculty responses to check for consistency and patterns, and to generate intervention strategies for DSMC.

Participants

The SoCQ was administered to the entire teaching faculty of approximately 135 professors during professional development and faculty training sessions at DSMC. The demographic profile of the typical DSMC faculty member was a well-educated, white, male, mid-career professional. Virtually all faculty are career military officers or civilian employees in the Department of Defense. Few, if any, have experience developing or facilitating courses using distance learning methods and computer-based training. In the Spring of 1998, only four courses were in the initial stages of development and coding to computer-based delivery, but within three years more than eighty courses were to be developed (Defense Acquisition University, 1997).

Development of Stages of Concern Questionnaire (SoCQ)

In 1973, the staff at RDCTE began exploring methods to assess the concerns of individuals about specific innovations. Through pilot studies they experimented with various open-ended formats, Likert scales, checklists, and personal interviewing techniques. By 1974, they had identified two methods for measuring stages of concern. The first method was a quick-scoring paper and pencil questionnaire, the SoCQ, which yields quantitative results about an individual's concerns. The second method, the Open-Ended Concerns Statement, results in a qualitative assessment of individual concerns (Hall, George, and Rutherford, 1986).

To develop the questionnaire, the RDCTE staff began by generating 544 potential items that could indicate a particular stage of concern. These items were consolidated and edited for consistency and redundancy, resulting in a 195-item pilot instrument with seven hypothesized stages of concern. In May 1974, this pilot instrument was taken by a sample of elementary school teachers and college faculty. The innovations of interest for this pilot study were team teaching in elementary school, and the use of instructional modules in colleges. From the 359 returned questionnaires, item correlation and factor analysis indicated that seven factors explained more than 60% of the common variance among the 195 items and that these seven factors correspond to the hypothesized stages (George, 1977).

This data convinced RDCTE staff members to infer that the seven factors represented independent constructs which could be identified with the seven stages of concern proposed in the Concerns-Based Adoption Model. A 35-item SoCQ was then constructed by selecting five of the most heavily loaded items for each stage. Therefore, the five items representing each stage on the questionnaire were selected to improve the likelihood of high internal reliability. The SoCQ and cover sheet with instructions are included in Appendix E. Appendix F is a list of all 35 items in groupings by stage.

Respondents to the SoCQ are asked to rate each item, using an eight-point Likert scale, as a means of indicating the degree to which that item reflects their own present concerns. Completion time is approximately 15 minutes. Scoring is accomplished by summing the responses to the five items that make up each stage. This total is the raw stage score. Percentile tables have been established which readily convert raw stage scores to percentile figures (see Appendix G). From these percentile figures, stages of concern profiles can be plotted that identify the peak or predominant stages of concern and the relative intensity of other concerns (Hall and George, 1979).

Reliability of Stages of Concern Questionnaire

In late 1974, the 35-item SoCQ was administered to 830 professors and teachers to explore their concerns about team teaching and instructional modules. Item analysis resulted in coefficients of internal reliability from a low of .64 to a high of .83, with five stages scoring .75 or greater (George, 1977, p. 7). Results are provided in Table 2.

Table 2

Coefficients of Internal Reliability for the SoCQ, N=830

Stage	0	1	2	3	4	5	6
Alphas	.64	.78	.83	.75	.76	.82	.71

(Table 2 from George, 1977, p. 7)

Test-retest correlations were computed after 132 respondents completed a retest two weeks later. Pearson r correlations for each stage score ranged from a low of .65 to a high of .86, with five of the stages again scoring higher that .75, as shown in Table 3.

Table 3

Test-Retest Correlations on the SoCQ, N=132

Stage	0	1	2	3	4	5	6
Pearson-r	**.65**	**.86**	**.82**	**.81**	**.76**	**.84**	**.71**

(Table 2 from George, 1977, p. 7)

These statistics suggest satisfactory reliability of the SoCQ instrument (Hall & George, 1979; Nunnaly & Bernstein, 1994).

Validity of Stages of Concern Questionnaire

Since other measures of concern did not exist to compare with the SoCQ, the RDCTE staff used intercorrelation matrices, interview data, and changes over time to investigate the validity of the instrument. Evidence for the validity of these stages as separate constructs which are related in a developmental way comes from intercorrelation analyses of the 195-item questionnaire and the 35 item questionnaire. Data from Tables 4 and 5 show that correlations near the diagonal are generally higher than those farther removed. This pattern indicates that each stage is most similar to those stages immediately beside it and suggests that the sequence of concerns stages could be developmental in nature (Hall and George, 1979).

Table 4

Intercorrelation of 195-Item SoCQ Scale Scores

	Stages					
	1	**2**	**3**	**4**	**5**	**6**
Stage 0	**1.0**	**.68**	**.47**	**.21**	**.21**	**.19**
Stage 1		**1.0**	**.78**	**.43**	**.37**	**.43**
Stage 2			**1.0**	**.60**	**.51**	**.59**
Stage 3				**1.0**	**.82**	**.80**
Stage 4					**1.0**	**.77**
Stage 5						**1.0**

(Table 4 from George, 1977, p. 8)

Table 5

Intercorrelation of 35-Item SoCQ Scale Scores

	Stages					
	1	**2**	**3**	**4**	**5**	**6**
Stage 0	**.48**	**.39**	**.13**	**-.27**	**-.30**	**-.16**
Stage 1		**.81**	**.32**	**.19**	**.18**	**.17**
Stage 2			**.47**	**.23**	**.18**	**.25**
Stage 3				**.24**	**.12**	**.37**
Stage 4					**.58**	**.57**
Stage 5						**.49**

(Table 5 from Hall and George, 1979, p. 15)

A more subjective validity study was conducted in the summer of 1976. Sixty-five educators (28 elementary teachers and 37 college professors) were selected at random from a larger group who completed the SoCQ several months earlier. From this sample, researchers attempted to measure the relationship between raw stage scores on the SoCQ and judges' assessments of concerns based on either open-ended statements or interviews. Although not all results were consistent, a relationship between SoCQ raw stage scores and estimates of peak stage of concerns was indicated (Hall and George, 1979).

Finally, RDCTE researchers conducted several longitudinal studies during the late 1970s that indicated that the SoCQ can reflect changes in concerns predicted by concerns theory. In one of these studies, elementary school teachers participated in a five-week summer workshop on a new approach to reading instruction. Teachers who attended the workshop exhibited significantly lower early stage concerns compared with teachers who had received only a one-day introduction without the workshop (Hall and George, 1979). In another study, a workshop was offered to elementary teachers about a pre-school thinking and reasoning program. Pre-workshop and post-workshop concerns assessments indicated that people with little experience with an innovation had greater Awareness, Informational and Personal concerns, and those with more experience had greater concerns about Collaboration and Refocusing.

Data from these validity studies provided confidence to researchers at RDCTE that the SoCQ is a valid measure of teacher concerns. In each of these studies, the pattern of concerns shifted developmentally over time as experience with the innovation increased. People with little experience consistently had greater self concerns, and those with more experience had greater impact concerns. These findings indicated that the SoCQ is very probably measuring concerns about the innovation as defined by the Concerns-Based Adoption Model.

Procedures

Permission to use the Stages of Concern Questionnaire was desired before the surveys were sent out, but the status of the copyright was unclear. The original copyright for the instrument was obtained by the RDCTE, but the instrument is now controlled by the Southwest Educational Development Laboratory, Austin, Texas. Dr. Joyce Pollard (Director, Office of Institutional Communications and Policy Services, Southwest Educational Development

Laboratory) agreed to grant permission to use the instrument upon receipt of a written request with an explanation of intended use (personal communication, Dr. Joyce Pollard, December 2, 1997). Permission was granted and is included in Appendix H. Dr. Gene Hall (University of Northern Colorado), one of the founders of the SoCQ at the RDTCE, was contacted independently while the researcher was seeking permission to use the instrument. He reported that the copyright was no longer in effect, but that he would still like to keep records of survey's usage (personal communication with Dr. Hall, July 29, 1997). Dr. Hall's permission to use the SoCQ is included in Appendix I.

With a cover letter from the Provost, the Stages of Concern Questionnaires, were personally delivered to each faculty department at DSMC beginning on January 7, 1998, with a pre-addressed return envelope. This cover letter (Appendix J) explained to the faculty the purpose of the survey and its importance to DSMC as the institution moves to technology-based education. The Provost's letter assured confidentiality of responses and strongly urged participation. The surveys were coded in numerical sequence to keep track of responses only, not to associate particular responses to individual respondents. As surveys were received, the coded numbers were tracked with names on the distribution list to maintain a record of completed surveys returned. Due to small size of the population (N=135), maximum participation was necessary.

When possible, surveys were administered to each academic department as a group during regularly scheduled training sessions. Even though the cover letter and survey provided a clear explanation of the purpose and structure of the survey, short briefings were provided to address any outstanding questions or issues from faculty. This process was followed for eight of the 13 departments from January 7, 1998 through January 16, 1998. This method resulted in achieving high response rates because these meetings showed clear support from the department chairmen, as well as the Provost. For the remaining five departments which did not have regularly scheduled training sessions, department chairmen were requested to personally contact each faculty member within the department to solicit support.

By January 28, 1998, faculty had returned 76% of the surveys and the researcher began coding data. On the following day, the remaining 24% of the population (32 people) were contacted by electronic mail and telephone to solicit a response to the survey. By February 13, 1998 the faculty had returned 129 surveys, yielding a response rate of 96%. Three of the 129 were not usable due either to mistakes resulting from misunderstanding survey instructions or to intentional disregard for the survey itself. Therefore, the usable return rate was 93% (126 out of 135). All participants were asked to provide demographic information, answer the standard 35 questions on the SoCQ, and answer one open-ended question about their primary concern with this innovation.

Data Processing and Analysis

This study used the Manual for the Use of the SoC Questionnaire (Hall, et al., 1986), Microsoft Excel spreadsheet, SAS Institute's and Abacus's Statview 4.1, and Super Anova statistical programs. Both quantitative and qualitative analyses to the responses to the Stages of Concern Questionnaire were conducted. The analysis procedure for each research question is presented below.

Research Question #1: What is the composite Stages of Concern Profile of DSMC faculty members about technology-based education and training?

Analysis procedure: The researcher used the SoCQ Quick Scoring Device (Hall, et al., 1986, p. 97) to calculate raw scores and relative intensity percentiles for the seven Stages of Concern for each respondent (Appendix G). The data was first screened for mistakes, inconsistencies, and outliers, then Stages of Concerns profiles were plotted for each respondent. The mean raw stage scores for the entire population determined the composite Stages of Concern Profile for the entire faculty. Then, the High Stage Score and Second High Stage Score method of analyses (Hall, et al., pp. 29-34) were used to assist in data interpretation.

Research Question #2: Do DSMC civilian faculty members and military faculty members differ in their Stages of Concern?

Analysis procedure: For this analysis, the researcher divided the faculty into two subgroups (civilian members and military members) and calculated a composite Stages of Concern Profile for each. The study compared both profiles for trends and differences, then tabulated the High Stage Score and Second High Stage Score for each group and conducted another comparative analysis. Next, a series of analyses of variance (ANOVAs) was conducted to identify any differences in the scores of these two groups for each stage of concern. Finally, a multivariate analysis of variance (MANOVA) was conducted across all seven stages to look for possible interaction effects.

Research Question #3: Do DSMC faculty members with varied levels of teaching experience differ in their Stages of Concern?

Analysis procedure: For this analysis, the researcher divided the faculty into two subgroups (those with less than 10 years of teaching experience, and those with more than 10 years of teaching experience) and calculated a composite Stages of Concern Profile for each. The study compared both profiles for trends and differences, then tabulated the High Stage Score and Second High Stage Score for each group and conducted another comparative analysis. Next, a series of ANOVAs was conducted to identify any differences in the scores of these two groups for each stage of concern. Finally, a MANOVA was conducted across all seven stages to look for possible interaction effects.

Research Question #4: Do DSMC faculty members with varied lengths of service with the Federal Government differ in their Stages of Concern?

Analysis procedure: For this analysis, the researcher divided the faculty into two subgroups (those with less than 24 years of Federal Service, and those with more than 24 years of Federal Service) and calculated a composite Stages of Concern Profile for each. The study compared both profiles for trends and differences, then tabulated the High Stage Score and Second High Stage Score for each group and conducted another comparative analysis. Next, a series of ANOVAs was conducted to identify any differences in the scores of these two groups for each stage of concern. Finally, a MANOVA was conducted across all seven stages to look for possible interaction effects.

Research Question #5: Do faculty members with <u>some</u> experience taking technology-based courses and faculty members with <u>no</u> experience taking technology-based courses differ in their Stages of Concern?

<u>Analysis procedure</u>: For this analysis, the researcher divided the faculty into two subgroups (those who had taken one or more technology-based courses, and those who had taken no technology-based courses) and calculated a composite Stages of Concern Profile for each. The study compared both profiles for trends and differences, then tabulated the High Stage Score and Second High Stage Score for each group and conducted another comparative analysis. Next, a series of ANOVAs was conducted to identify any differences in the scores of these two groups for each stage of concern. Finally, a MANOVA was conducted across all seven stages to look for possible interaction effects.

After the quantitative analysis was completed, all answers to the open-ended question (Section B of the survey) and responses to the additional comments portion (Section D of the survey) were listed for the entire faculty. Answers and responses were then arranged into categories and grouped within the categories for comparison with both the quantitative survey results and data from the site visits. Trends were then noted and related back to the research questions. These comparisons were used to evaluate consistency of responses and to prepare intervention recommendations.

Summary

This chapter included a description of the subjects for this study, the survey instrument, the procedures for the study, and the data analyses. The results of this study will be presented in Chapter IV. Conclusions and recommendations will be presented in Chapter V.

CHAPTER IV

RESULTS

Introduction

This chapter examines the research findings for this study. Also, it contains the procedures and conventions followed to address the research questions. The population and sample are then discussed. Expectations, actual survey responses, and separate analyses are presented in support of each research question. Stages of concern profiles with supporting analyses are shown for the total population and for each subgroup of interest. High Stage Score and Second High Stage Score comparisons are also shown for the total population and each subgroup. Data entry and management were accomplished using Microsoft Excel, a spreadsheet software package. SAS Institute's and Abacus's Statview 4.1 and Super Anova statistical programs were used for all analyses. Appropriate data presentation and discussion is presented to support the results framed around each research question. A combination of quantitative and qualitative analyses of the responses to the Stages of Concern Questionnaire is presented and discussed to assist in interpretation of results.

Questionnaire Respondent Demographics

The target population for this study was the teaching faculty of the Defense Systems Management College, comprised of mostly either active duty military officers or former active duty military officers. This sample is not atypical in regard to the demography of the Department of Defense acquisition workforce as depicted in Table 6 below. Approximately 88% of the population were male and 12% were female. Approximately 89% of the population were Caucasian, 4% were African American, and the remaining 7% were made up of the following groups: Asian, Hispanic, American Indian, and “other”. The highest education level for the majority of respondents was a master’s degree (approximately 84%). Almost 11% had earned doctorates, while the remaining 5% had bachelors degrees.

Table 6
Questionnaire Respondent Demographics

Sex		
Male	Female	
111 (88%)	15 (12%)	
Ethnic Background		
Caucasion	African-American	Other
112 (89%)	5 (4%)	9 (7%)
Education Level		
Bachelors	Masters	Doctorate
6 (5%)	106 (84%)	14 (11%)

Of the 135 surveys handed out, 129 were received, yielding a return rate of 95%. Of the 129 received, 126 were usable, resulting in a usable return rate of 93%.

The breakout subgroup categories corresponding to the research questions are shown in Table 7. All five research questions yielded unequal-sized groups for comparison.

Table 7
Faculty Subgroups by Research Question

Research Question #2		
Subgroup	Number	Percentage
Civilian	72	57%
Military	54	43%
Research Question #3		
Subgroup	Number	Percentage
Fac Exp <10 yr	81	64%
Fac Exp >10 yr	45	36%
Research Question #4		
Subgroup	Number	Percentage
Fed Ser <24 yr	66	52%
Fed Ser >24 yr	60	48%

<u>Research Question #5</u>

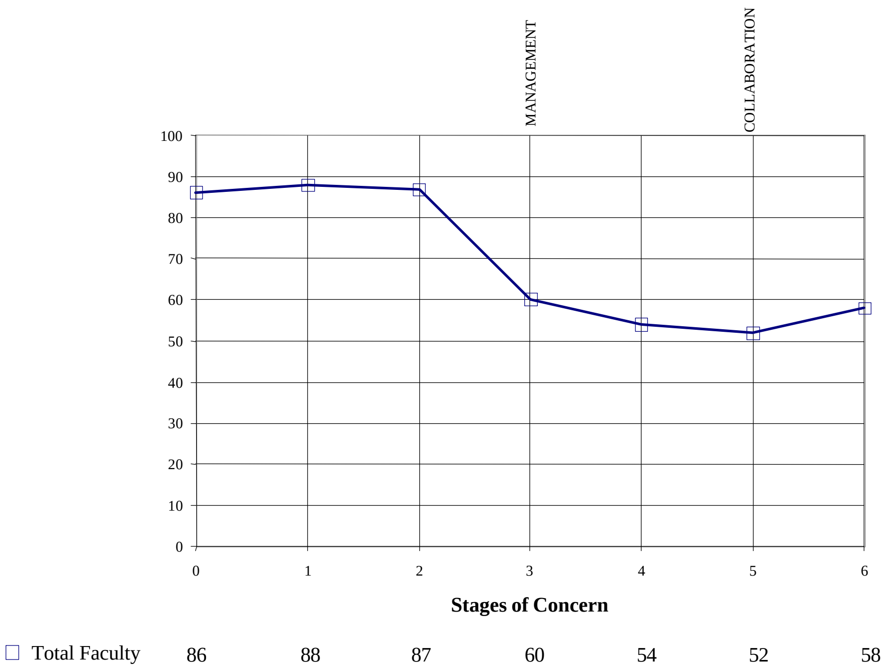
Subgroup	Number	Percentage
No Tech-Based Exp	81	64%
Some Tech-Based Exp	45	36%

Thus, a demographic portrait of a typical DSMC faculty member in this sample could be described as a highly educated (master's degree), white male, mid-career professional with not much experience in technology-based courses. This profile was useful in my preliminary planning for possible interventions and affected my expectations and follow-on comparative analyses to support my findings.

Data Analysis

<u>Research Question #1</u>: ***What is the composite Stages of Concern Profile of DSMC faculty members about technology-based education and training?***

A total of 126 responses of the faculty were analyzed together to answer research question #1. The means of the raw stage scores for the entire population were used to plot a composite Stages of Concern Profile for the entire faculty. This profile, shown in Figure 7, represents a characteristic and typical "nonuser profile" (Hall, et al., 1986, p. 36).

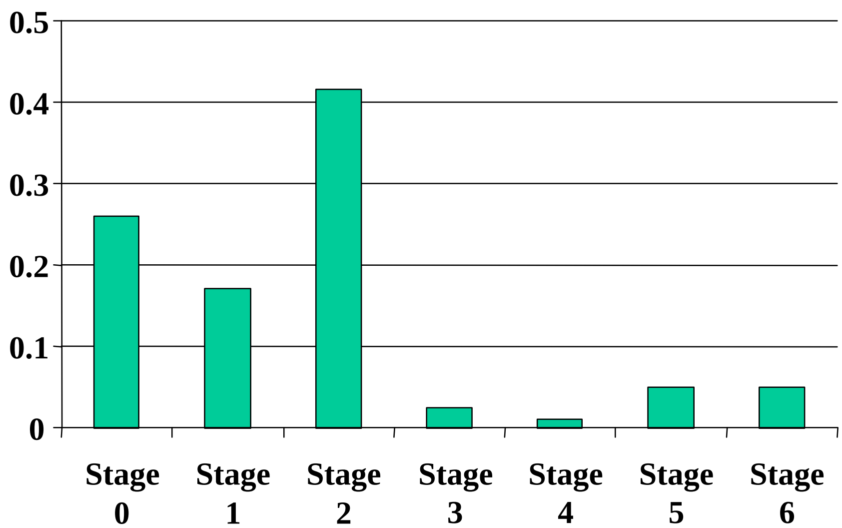


<u>Figure 7</u>. Stages of Concern Profile For Total Faculty (N=126)

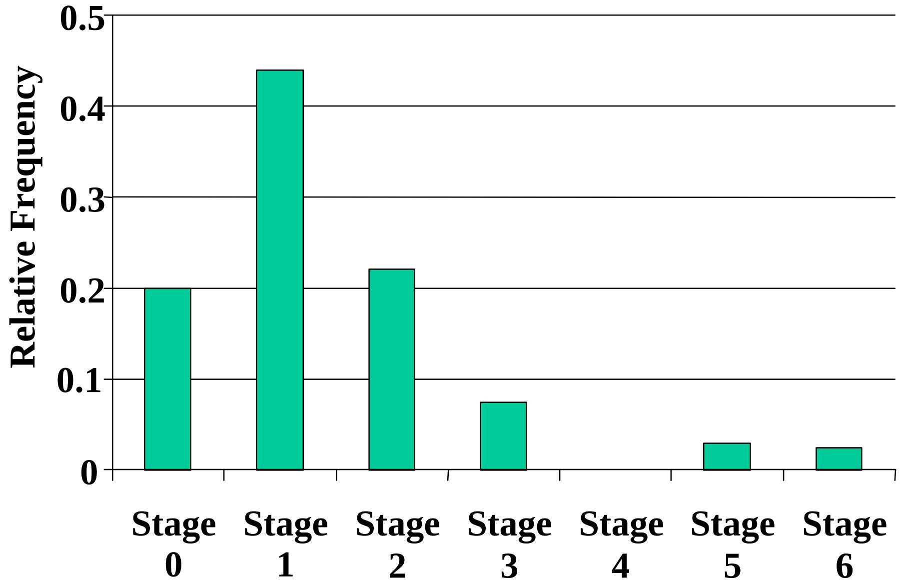
Interpretations of the DSMC faculty sample profiles are derived from instrument administration guidelines (Hall, et al., 1986) and its Stages of Concern theoretical framework. The scores of self-concerns (Stages 0, 1, and 2) are relatively high and close to each other (within 2%), the task concern (Stage 3) is much lower, and the impact concerns (Stages 4, 5, and 6) are even lower. The high Stage 0 (Awareness) score indicates a low interest in the innovation relative to other activities. The high Stage 1 (Information) score reveals a lack of understanding of what the innovation involves, and the high Stage 2 (Personal) score gives an indication that the faculty is very concerned over the impact of the innovation on their professional duties, responsibilities, and day-to-day activities. The Stage 2 concerns are almost as high as Stage 1 concerns, indicating that the personal concerns are essentially the same as the informational concerns. The faculty is as concerned with the personal changes that this innovation may bring to them as they are with understanding more about the change itself. The tailing-up of the profile at Stage 6 is an important finding. “Tailing-up” refers to the changing slope of the SOC profile, specifically, the condition where the relative intensity of Stage 6 (Refocusing) is greater than the relative intensity of Stage 5 concerns. This characteristic in a nonuser profile is interpreted by Hall et al. (1986) to indicate a resistance to the innovation, or possibly a desire to re-direct or modify the innovation. Moreover, Hall et al. (1986, p. 55) describes an individual with this type of profile (nonuser with tailing-up Stage 6) as “likely to be negative toward the innovation”.

The High Stage Score and Second High Stage Score were also examined for the respondents. Hall et al. (1986) emphasized that these scores are important primary indicators in the interpretation of concerns. Figure 8 shows that 42% (.42 relative frequency) of the faculty expressed their highest concerns at Stage 2. Also, 26% of the faculty chose State 0 as their highest stage, and 17% chose Stage 1 as the highest. Since 85% of faculty had their highest Stage of Concern in either Stage 0, 1, or 2, this reflects the nonuser profile. Hall, et al., (1986, p. 36) say that the “nonuser SoCQ Profile is probably the most readily identified and commonly found concerns profile.”

The Second High Stage Score for all faculty was also examined, and is shown in Figure 9. This histogram shows that 44% of faculty expressed their second highest concern at Stage 1. Additionally, 22% of faculty chose Stage 2 as their Second Highest Stage,



<u>Figure 8.</u> **High Stage Score: Total Faculty**

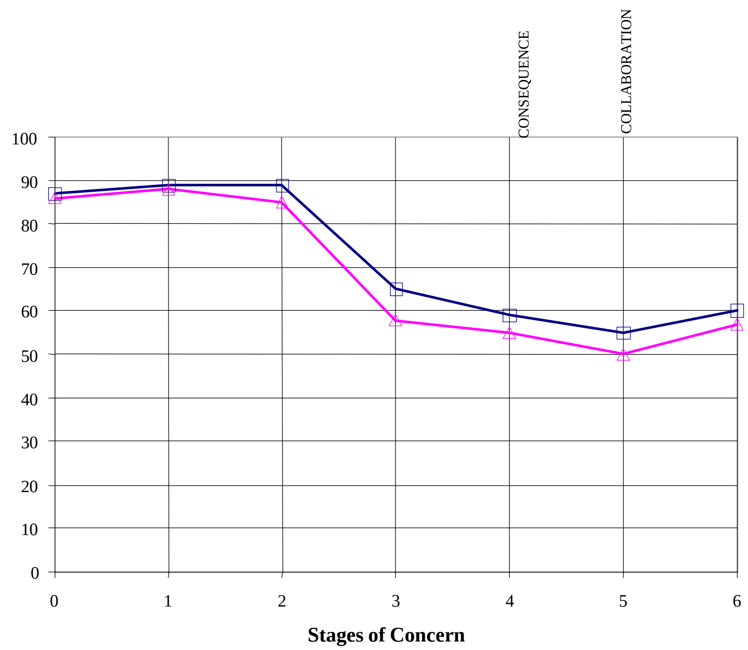


<u>Figure 9.</u> Second High Stage Score: Total Faculty

and 20% chose State 0 as the Second Highest Stage. Therefore, 86% of faculty had either State 0, 1, or 2 as their Second Highest Stage. The combination of High and Second High Stage scores shown is Figures 2 and 3 clearly show far greater early stage concerns (Stages 0, 1, and 2) when compared to later stage concerns. These data reaffirm that the overall composite faculty profile (Figure 7) is a typical nonuser profile, characterized by Hall et al. (1986) as "normally highest in Stages 0,1, and 2, and lowest in Stages 4, 5, and 6" (p. 36).

<u>Research Question # 2</u>*: Do civilian faculty members and military faculty members differ in their stages of concern?*

In this analysis, the faculty population was divided into two groups: a) government civilians, and b) active duty military officers. A total of 72 government civilians comprised the first group and 54 military officers were in the second. Stages of Concern were calculated for each group. Individual Stages of Concern profiles for each group are depicted in Appendix K. A graphical comparison of both group profiles is displayed below in Figure 10. From a heuristic examination of the relationships in Figure 10, both groups have very similar profiles and are representative of the "nonuser". The civilian group concerns profile is slightly higher in intensity level, but across all of the stages the difference seems small. The Stage 2 (Personal) concerns of the civilian group was equal in relative intensity to the Stage 1 (Informational) concerns, which according to Hall et al. (1986) could be problematic. They state, “When Stage 2 concerns are equal or more intense than Stage 1 concerns … personal concerns override concerns about learning more about the innovation. The individual is much more concerned about his/her personal well-being than he/she is interested in learning more of a substantive nature about the innovation” (p. 36). Additionally, the Stage 6 score tails-up for both groups, which according to

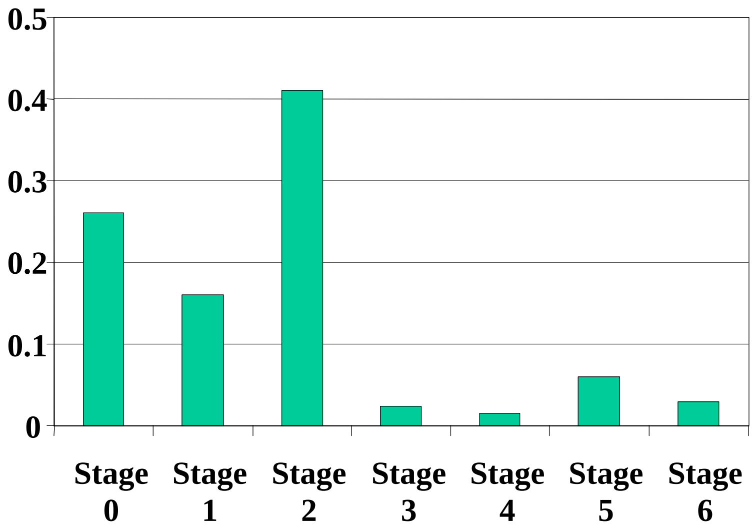


	0	1	2	3	4	5	6
□ Civilian Faculty	87	89	89	65	59	55	60
△ Military Faculty	86	88	85	58	55	50	57

Figure 10. SoC Profile Comparison: Civilian/Military

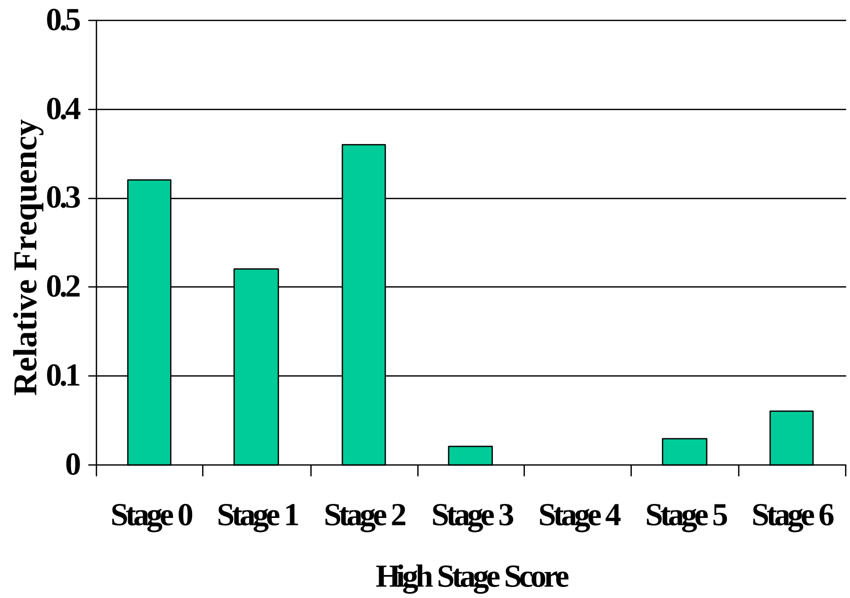
Hall, et al., (1986) represents potential resistance to the innovation. Hall et al. (1986) point out that when Stage 6 concerns tail-up, then "one can infer that the respondent has other ideas that she/he sees as having more merit than the proposed innovation" (p. 40).

The High Stage Score and Second High Scores for the civilian and military groups were also tabulated and graphically displayed and are shown in Figures 11 through 14. The High Stage Score for the civilian group (Figure 11) was Stage 2 (42%) and the High Stage Score for the military group (Figure 12) was also Stage 2 (37%). The Second High Stage Score for the civilian group (Figure 13) was Stage 1 (45%) and the Second High Stage Score for the military group (Figure 14) was also Stage 1 (45%).

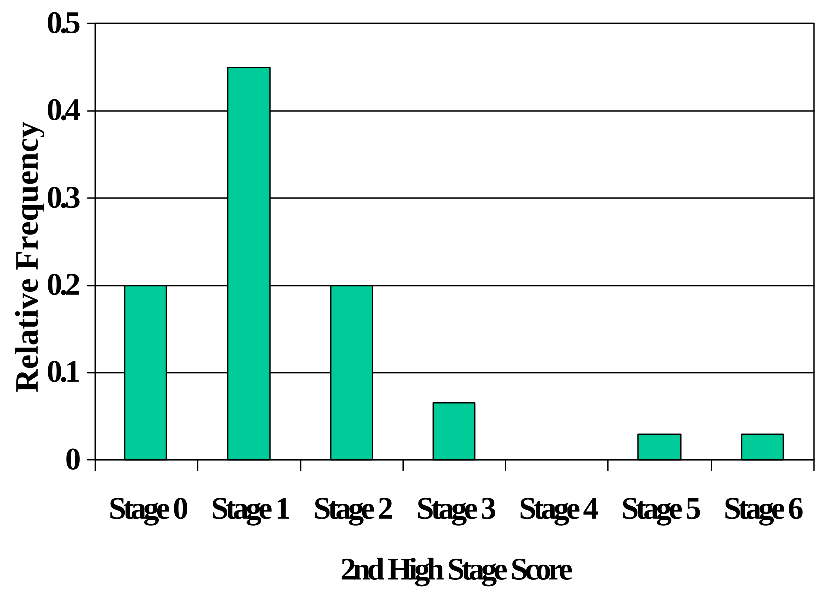


<u>Figure 11.</u> High Stage Score: Civilian Faculty

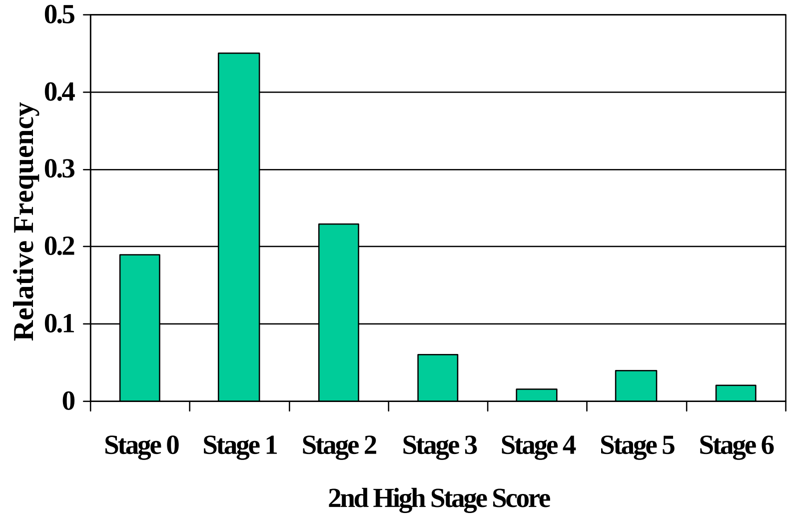
Therefore, both civilian and military groups had the same High and Second High Stage preferences, verifying the consistency shown in the composite Stages of Concern profile comparison (Figure 10).



<u>Figure 12.</u> High Stage Score: Military Faculty



<u>Figure 13.</u> Second High Stage Score: Civilian Faculty



<u>Figure 14.</u> Second High Stage Score: Military Faculty

Initially, to analyze the observed differences in Stages of Concern between civilian and military faculty members, the researcher conducted a series of separate analyses of variance (ANOVAs). Analysis of variance is more robust than MANOVA for violations of sample distribution and normalcy. However, to account for possible interaction of the effects and possible type I error in each result, multivariate analyses of variance (MANOVAs) were subsequently conducted separately for each group of interest across all seven stages and again in a full multivariate model with all independents and dependents included. Since the groups were not equal and multivariate assumptions for normalcy were not met, the results were cautiously analyzed and compared to the separate more robust ANOVAs (Nunnally & Bernstein, 1994; Tabachnick & Fidell, 1989). Separate ANOVAs are depicted and listed for each group and stage of concern in Table 8. Except for Stage 2, group differences were not significant. One possible interpretation of a Stage 2 difference could be the basic philosophy and outlook of civilian faculty versus military faculty due to the nature of their relationship with DSMC. Since civilian faculty are more permanent and military faculty are more temporary, these groups may have differing personal views and organizational priorities.

Table 8
ANOVA for Stage Scores : Research Question #2

Concern	Civilian		Military		F-ratio	P-value
	Mean	Std Dev	Mean	Std Dev		
0 Awareness	12.6	5.8	12.1	4.4	0.197	0.6576
1 Informational	24.5	4.9	23.9	4.9	0.416	0.5204
2 Personal	27.2	4.9	23.9	4.9	4.216	0.0422 *
3 Management	17.0	6.7	15.4	5.4	2.212	0.1359
4 Consequence	25.9	6.1	25.3	4.7	0.381	0.5383
5 Collaboration	22.0	7.8	20.6	6.6	1.146	0.2865
6 Refocusing	18.9	5.9	18.2	5.7	0.465	0.4967

* p<.05

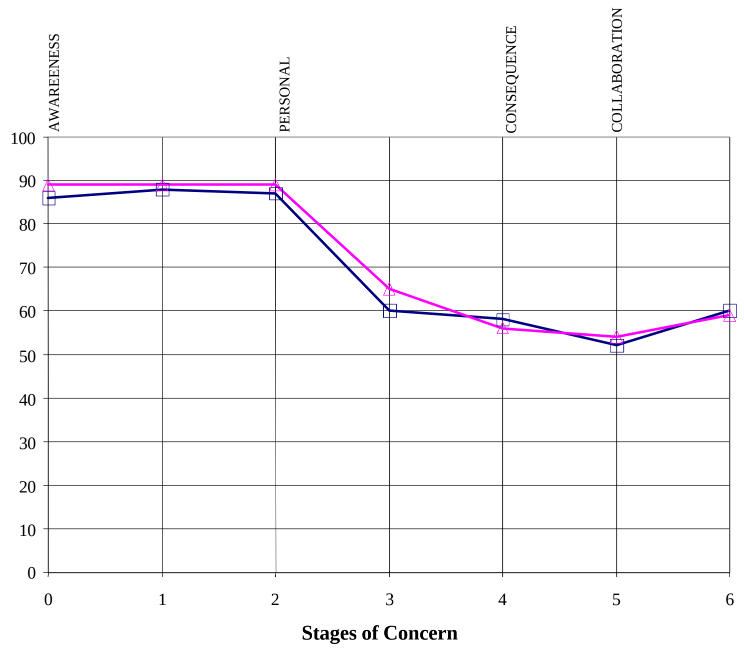
Further analysis of the Stage 2 results was deemed prudent to determine if the significant difference between the groups was due to chance and to investigate the effect of other possible relationships. A MANOVA was conducted using the same 2 independent variables and all 7 dependent variables (the 7 stage scores). The results, shown in Table 9, did not support a significant difference of the groups on any of the stages of concern. Though all four conventional multivariate analysis of variance statistics are displayed (Wilks' Lambda, Roy's Greatest Root, Hotelling-Lawley Trace, and Pillai Trace), the Pillai Trace criterion was used in this analysis to determine and evaluate multivariate significance. The Wilks' Lambda statistic may be the most widely used among the four (Pedhazur, 1982), but the Pillai Trace is more robust than the other three when used with small sample sizes and unequal group sizes (Olson, 1979), as in this research. Since main effects were not significant, there was no need to check for interactions, contrasts, or step-down analyses (Tabachnick & Fidell, 1989). The comparative analyses (SoC Profile, High/Second High Stage Score, ANOVA, and MANOVA) all tend to suggest no significant differences in the Stages of Concern between civilian faculty and military faculty.

Table 9
<u>MANOVA for Stage Scores: Research Question #2</u>

Type III MANOVA table	Value	df Num	df Den	F-ratio	P-value
Wilks' Lambda	0.939	7	114	1.055	0.397
Roy's Greatest Root	0.065	7	114	1.055	0.397
Hotelling-Lawley Trace	0.065	7	114	1.055	0.397
Pillai Trace	0.061	7	114	1.055	0.397

Research Question #3: ***Do DSMC faculty members with varied levels of teaching experience differ in their Stages of Concern?***

In this analysis, the faculty were divided into two groups: a) those individuals with less than 10 years of faculty experience, and b) those with more than 10 years experience. Eighty-one faculty were in the less experienced group and 45 were in the more experienced group. Stages of Concern profiles for both groups were calculated, and individual group profiles are included in Appendix L. A comparison of both group profiles is shown in Figure 15. Examination of this data shows very similar concerns in both groups, with highest scores at stages 0, 1, and 2, again representing the nonuser profile. The group with less faculty experience had Stage 2 (Personal) concerns (relative intensity of 87) which were only slightly lower than the Stage 1 (Informative) concerns (relative intensity of 88). The group with greater than ten years faculty experience had Stage 2 (Personal) concerns which were equal to the Stage 1 (Information) concerns (both had a relative intensity of 89). As mentioned earlier, this situation warrants management attention

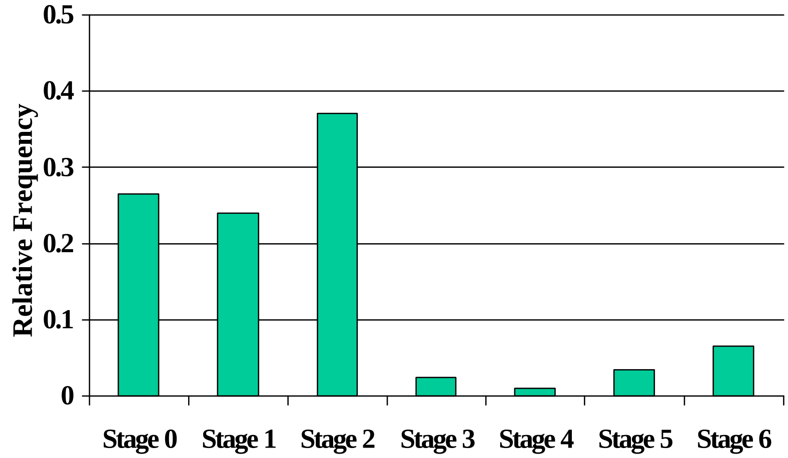


	0	1	2	3	4	5	6
□ <10 yrs exp	86	88	87	60	58	52	60
△ ≥10 yrs exp	89	89	89	65	56	54	59

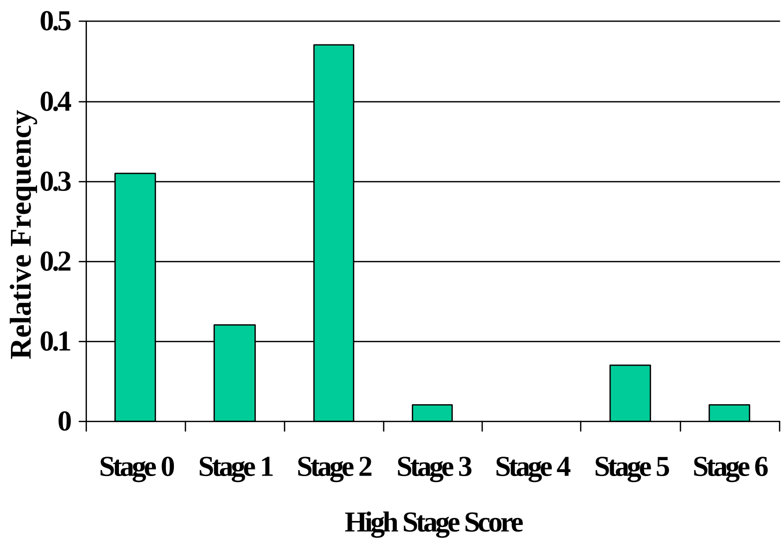
<u>Figure 15.</u> SoC Profile Comparison: <10 yr, >10 yr Faculty Experience

because it could be a signal of future problems for this innovation, especially when coupled with another tailing-up Stage 6.

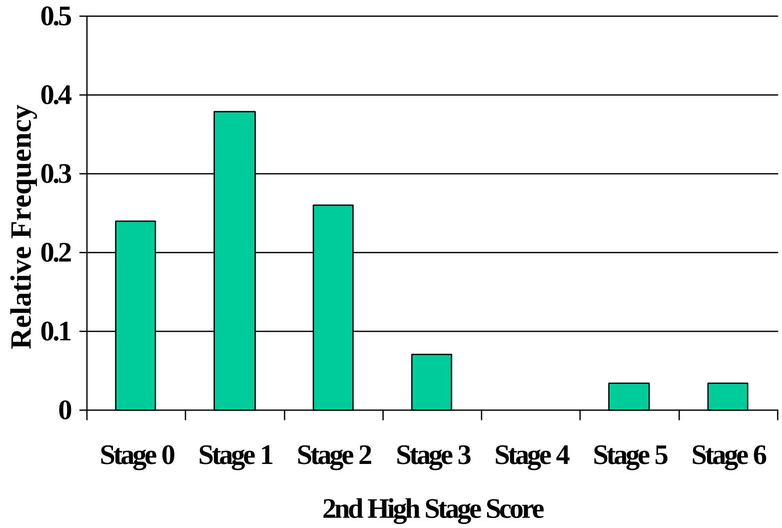
The High Stage Score and Second High Stage Scores for both faculty experience groups were also calculated to further analyze Research Question #3 and are shown in figures 16 through 19. Among the less experienced faculty, 37% selected Stage 2 (Personal) as their highest concern stage (Figure 16). A similar result came from the more experienced group, of which 47% also had Stage 2 as their concern stage (Figure 17). The Second High Stage scores were also calculated from survey data. As seen in Figure 18, 38% of the less experienced faculty group selected Stage 1 as their second highest stage. Correspondingly, 56% of the more experienced faculty selected (Figure 19) Stage 1 as their highest stage. In summary, both faculty experience groups reported the same High Stage Score and Second High Stage Score, which is consistent with their similar Stages of Concern profiles.



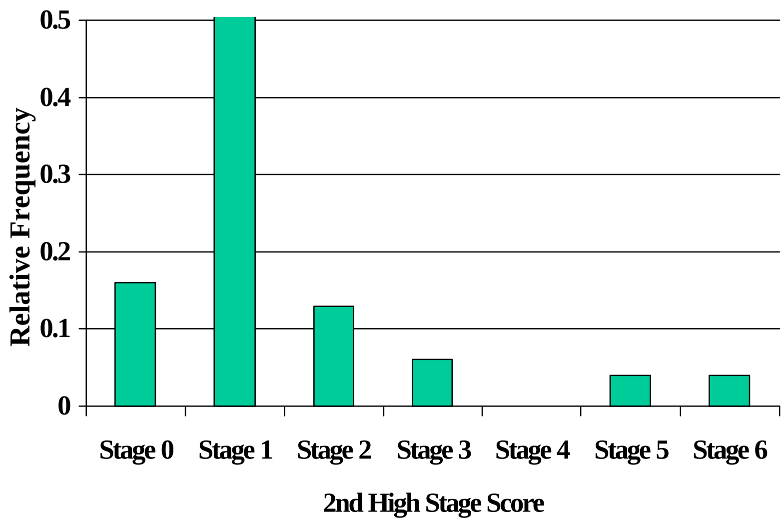
<u>Figure 16.</u> High Stage Score: Faculty Experience <10 yr



<u>Figure 17.</u> High Stage Score: Faculty Experience >10 yr



<u>Figure 18.</u> Second High Stage Score: Faculty Experience <10 yr



<u>Figure 19:</u> Second High Stage Score: Faculty Experience >10 yr

To quantify any difference in Stages of Concern between the faculty experience groups, another series of ANOVAs was conducted independently for each group across each Stage of Concern, and the results are shown in Table 10. In each run, the independent variables were the two groups and the independent variables were the stage scores for each group. Once again,

Table 10
ANOVA for Stage Scores: Research Question #3

Concern	Fac Exp <10 yr		Fac Exp >10yr		F-ratio	P-value
	Mean	Std Dev	Mean	Std Dev		
0 Awareness	11.9	4.8	12.9	5.9	1.004	0.3184
1 Informational	23.9	5.3	24.4	4.9	0.227	0.5998
2 Personal	25.8	5.9	27.2	5.0	2.015	0.1583
3 Management	16.0	6.2	17.1	6.3	0.981	0.3239
4 Consequence	25.7	4.8	25.7	6.6	0.005	0.9828
5 Collaboration	21.2	6.8	21.7	7.9	0.119	0.7312
6 Refocusing	18.7	5.5	18.6	6.5	0.005	0.9441

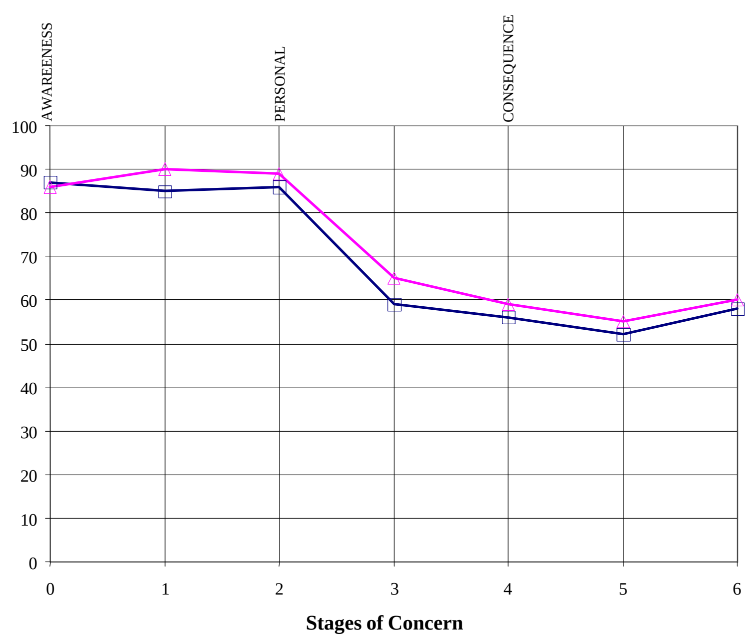
the examination revealed no significant statistical differences between stage scores for these two groups. Next, as before (using the same conventions and cautions), a MANOVA was conducted across all seven stages (Table 11). Due to unequal group sizes and small sample sizes, the Pillai statistic was used to determine significance (though all yielded the same results.). All analyses found no significant differences in the Stages of Concern between less experienced faculty (less than 10 years of teaching experience) and more experienced faculty (greater than 10 years of teaching experience).

Table 11
MANOVA for Stage Scores: Research Question #3

Type III MANOVA table	Value	df		F-ratio	P-value
		Num	Den		
Wilks' Lambda	0.965	7	118	0.612	0.7451
Roy's Greatest Root	0.036	7	118	0.612	0.7451
Hotelling-Lawley Trace	0.036	7	118	0.612	0.7451
Pillai Trace	0.036	7	118	0.612	0.7451

<u>Research Question #4</u>: ***Do DSMC faculty members with varied lengths of service with the Federal Government differ in their Stages of Concern?***

For analysis of this research question, the faculty was divided into two groups: a) those with fewer than 24 years of federal service, and b) those with more than 24 years of federal service. Sixty-six faculty members had fewer than 24 years of federal service, and sixty had more than 24 years of federal service. Stages of Concern profiles for both groups were calculated and individual group profiles are included in Appendix M. A comparison of both group profiles is shown in Figure 20. Examination of this data shows very similar concerns in both groups, with highest scores at Stages 0, 1, and 2. For the group with less than 24 years of federal service,

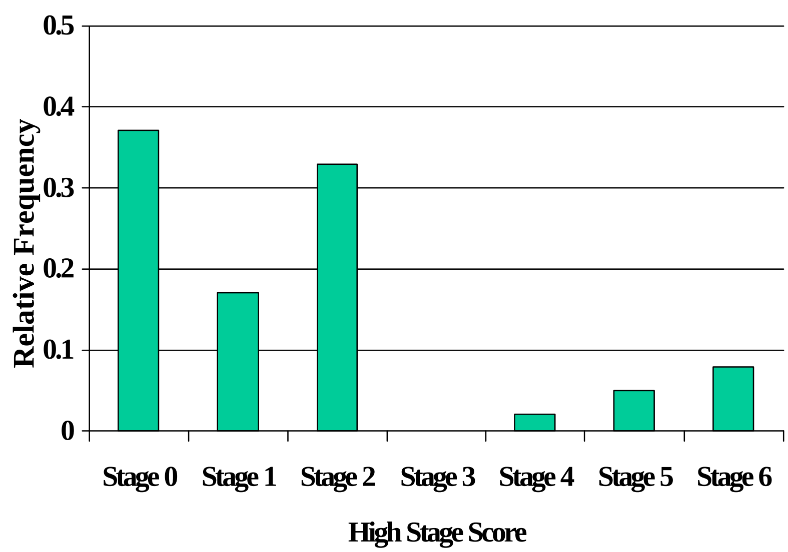


	0	1	2	3	4	5	6
□ <24 yrs exp	86	90	89	65	59	55	60
△ ≥24 yrs exp	87	85	86	59	56	52	58

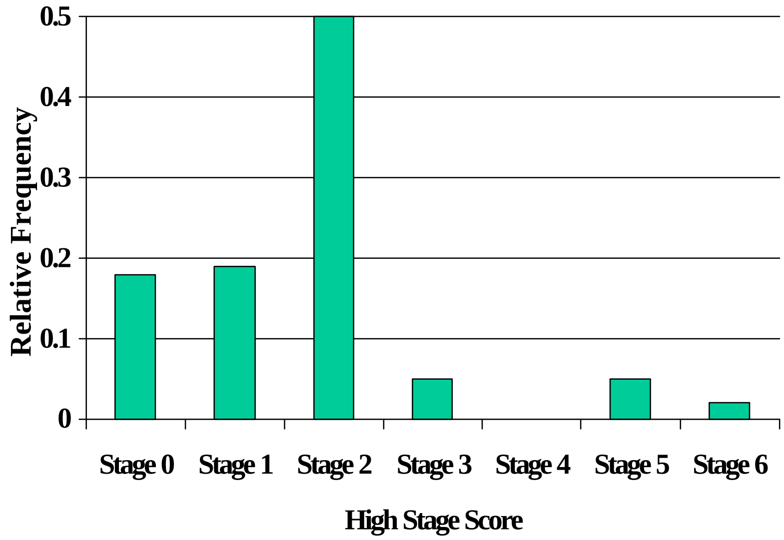
<u>Figure 20</u>. SoC Profile Comparison: <24 yr, >24 yr Federal Service

the stage 2 score (86) was greater than the stage 1 score (85), which is Hall et al. (1986) call a "negative one/two split" (p. 36). This type of profile corresponds to high personal concerns about the innovation's consequences and a negative attitude toward the innovation. Even though the negative one/two split was small (a one-point difference), this situation is not healthy for the faculty and requires management attention with appropriate interventions. From the tailing-up Stage 6 in these profiles, the researcher could infer that the respondents may have other ideas that they see as having more merit than the proposed methods for integrating technology-based courses into DSMC's curriculum.

The High Stage Score and Second High Stage Score for both groups were also calculated to further analyze Research Question #4 and are shown in Figures 21 through 24. For the group with less federal service, 37% selected Stage 0 as their highest Stage of Concern, and a total



<u>Figure 21</u>. High Stage Score: <24 yr Federal Service



<u>Figure 22.</u> High Stage Score: >24 yr Federal Service

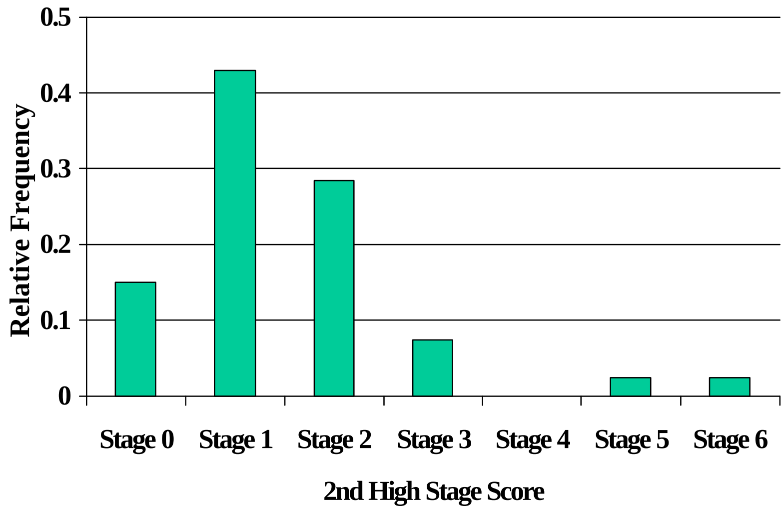


Figure 23. Second High Stage Score: < 24 yr Federal Service

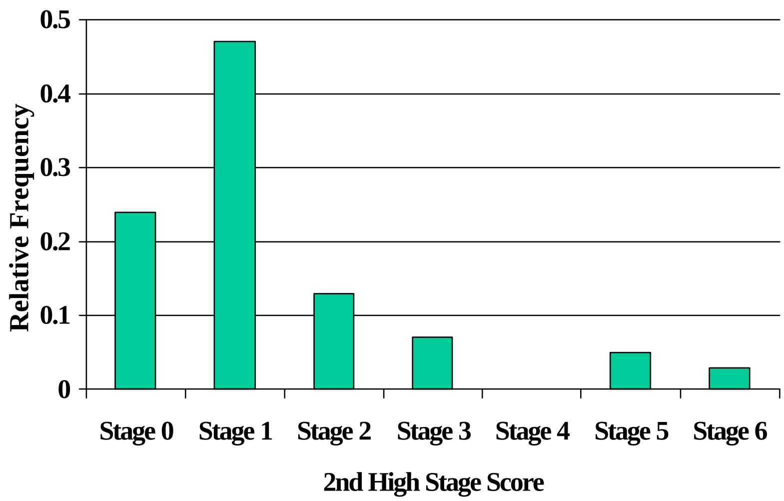


Figure 24. Second High Stage Score: >24 yr Federal Service

of 87% of this group selected either Stage 0, 1, or 2 as their highest stage (Figure 21). For the group with more federal service, 50% selected Stage 2 as their highest stage and a total of 87% selected either stage 0, 1, or 2 as their highest state (Figure 22). Regarding Second High Stage Scores (Figures 23 and 24), both these groups scored Stage 1 as their highest Stage of Concern. These data show the similarity in Stages of Concern between these two groups and again clearly represent the nonuser profile.

To test for any differences in Stages of Concern between the faculty groups with more/less federal service, a series of ANOVAs was conducted for faculty in each group, and the results are shown in Table 12. In each analysis, the independent variables were the two groups, and the dependent variables were the stage scores for each group.

Table 12
ANOVA for Stage Scores: Research Question #4

Concern	Fed Ser <24 yr		Fed Ser >24yr		F-ratio	P-value
	Mean	Std Dev	Mean	Std Dev		
0 Awareness	12.5	5.2	12.0	5.2	0.099	0.7534
1 Informational	23.2	5.6	25.1	4.5	1.736	0.1901
2 Personal	25.5	6.1	27.1	4.9	1.260	0.2639
3 Management	15.7	6.1	17.2	6.3	1.288	0.2586
4 Consequence	26.0	5.8	25.7	5.5	0.248	0.6197
5 Collaboration	21.1	6.77	21.8	7.8	0.176	0.6759
6 Refocusing	18.4	6.0	18.9	5.6	0.242	0.6239

All seven ANOVAs did not yield a significant difference between the groups. As before, a MANOVA was conducted across all stages (Table 13) and did not yield significant group difference across all seven stages. These four analyses (SoC Profile, High/Second Stage Score, ANOVA, and MANOVA) all tend to confirm that there were no significant statistical

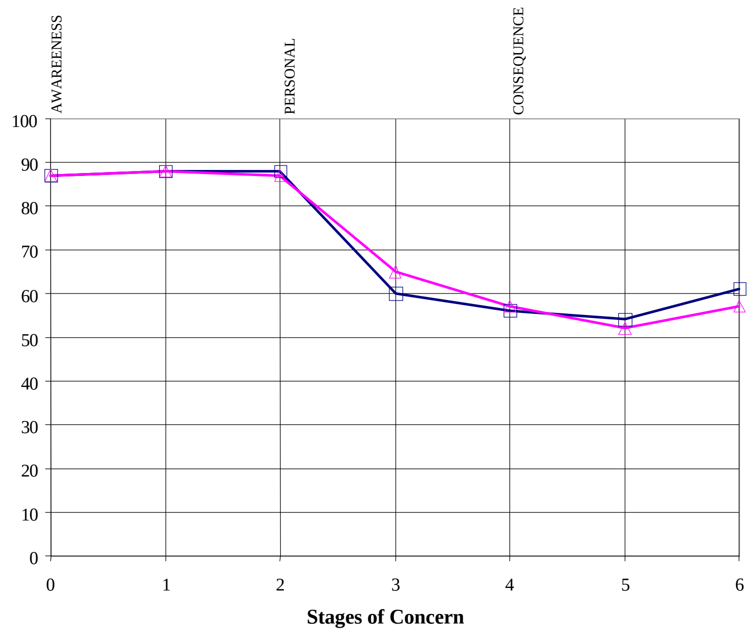
Table 13
MANOVA for Stage Scores: Research Question #4

Type III MANOVA table	Value	df Num	df Den	F-ratio	P-value
Wilks' Lambda	0.970	7	117	0.522	0.8164
Roy's Greatest Root	0.031	7	117	0.522	0.8164
Hotelling-Lawley Trace	0.031	7	117	0.522	0.8164
Pillai Trace	0.030	7	117	0.522	0.8164

differences in the Stage of Concern between faculty with less than 24 years federal service and faculty with more than 24 years federal service.

Research Question #5: ***Do faculty members with some experience taking technology-based courses and faculty members with no experience taking technology-based courses differ in their Stages of Concern?***

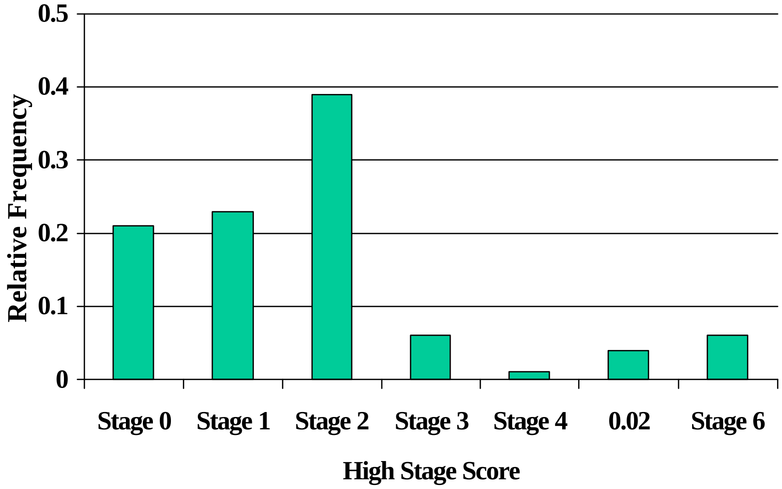
For analysis of this research question, the faculty population was divided into two groups: a) those who had taken technology-based courses, and b) those who had not. Forty-five people were in the first group (some experience with technology-based courses) and eighty-one people in the second group (no experience). Individual Stages of Concern profiles for each group can be found in Appendix N. A comparison of both group profiles is shown in Figure 25. Examination of this data shows very similar profiles, both representative of the nonuser, and quite similar to all previous faculty profiles in this study.



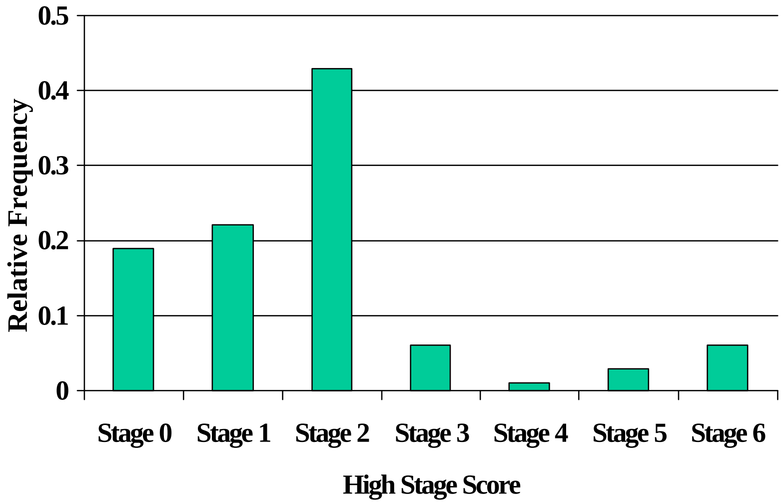
	0	1	2	3	4	5	6
□ No Tech exp	87	88	88	60	56	54	61
△ ≥ Some Tech exp	87	88	87	65	57	52	57

<u>Figure 25.</u> SoC Profile Comparison: No, Some Tech-Based Cse Exp

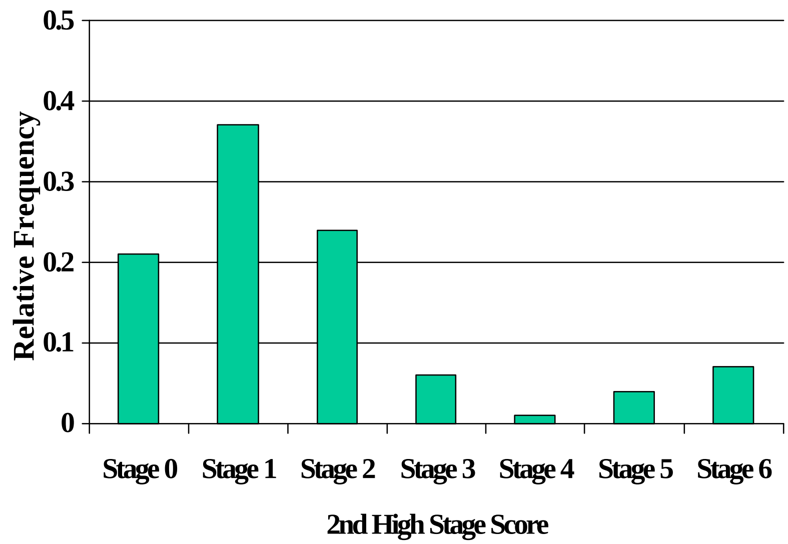
The High Stage Score and Second High Stage Score analysis also yields consistent results from these 2 groups as seen in Figure 26 through 29. The High Stage Score for the group with



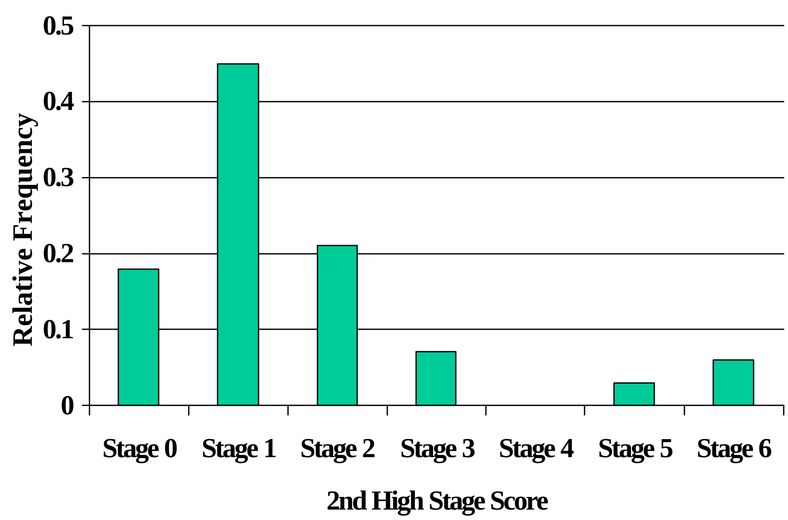
<u>Figure 26.</u> High Stage Score: No Technology-Based Course Experience



<u>Figure 27.</u> High Stage Score: Some Technology-Based Course Experience



<u>Figure 28</u>. Second High Stage Score: No Technology-Based Course Experience



<u>Figure 29</u>. Second High Stage Score: Some Technology-Based Course Experience

no technology experience (Figure 26) was Stage 2 (38%) and the result was also Stage 2 (43%) for the group with some technology experience (Figure 27). Results were similar for the Second High Stage Score data. The group with no technology experience (Figure 28) chose Stage 1 as their Second Highest Stage Score (37%) and group with some technology experience (Figure 29) also selected Stage 1 as the Second Highest (45%).

A series of one-way ANOVAs was conducted independently to determine group differences across all seven Stages of Concern and the results are listed in Table 14. These analyses yielded no significant statistical differences between these two groups of faculty. A MANOVA, using the same conventions and precautions as previous analyses in this study, was then conducted across all seven stages and the results are shown in Table 15.

Table 14

ANOVA for Stage Scores: Research Question #5

Concern	No T-B Exp		Some T-B Exp		F-ratio	P-value
	Mean	Std Dev	Mean	Std Dev		
0 Awareness	12.2	4.9	12.2	5.9	0.043	0.8358
1 Informational	24.2	5.1	23.9	5.3	0.113	0.7375
2 Personal	26.5	5.1	26.0	6.5	0.219	0.6405
3 Management	16.1	6.3	16.9	6.1	0.476	0.4914
4 Consequence	25.6	4.9	25.8	6.5	0.036	0.8497
5 Collaboration	21.7	7.0	21.0	7.7	0.279	0.5986
6 Refocusing	18.2	5.4	18.6	5.8	1.093	0.2978

Table 15
MANOVA for Stage Scores: Research Question #5

Type III MANOVA table	Value	df Num	df Den	F-ratio	P-value
Wilks' Lambda	0.973	7	118	0.469	0.8552
Roy's Greatest Root	0.028	7	118	0.469	0.8552
Hotelling-Lawley Trace	0.028	7	118	0.469	0.8552
Pillai Trace	0.027	7	118	0.469	0.8552

These four analyses (SoC Profile, High/Second High Stage Score, ANOVA and MANOVA) all report no significant statistical differences between those faculty with some technology-based course experience and those with no technology-based course experience.

Responses to Open-Ended Question

Following the demographic portion of the SoC survey, a section labeled "Your Concerns" (Section B) was added to capture open-ended responses (Newlove & Hall, 1976). In this section the survey asks the following question to determine the attitudes and opinions of the respondents: *When you think about technology-based education and training, what concerns you most?* Eighty-eight percent of the faculty (N=113) did respond to this section of the survey. Even though the desired response was the single issue which the respondent is most concerned about, some respondents did give multiple answers. All answers were included and were considered in this important part of the study. A total of 151 issues were mentioned and the researcher arranged them into three categories: *educational issues* (92), *implementation issues* (36), and *general management issues* (27). Table 16 provides a summary of faculty responses to the open-ended question grouped by these categories.

Table 16.
<u>Responses to Open-Ended Question</u>

IMPLEMENTATION (36)	EDUCATION (92)	GENERAL MANAGEMENT (27)
Need more training (16)	Loss of interaction (student-to-student and instructor-to-student) & Lack of personal real-time feedback (43)	Skeptical of DAU Management: …… poor implementation capability …… poor planning …… unrealistic goals …… no requirements process …… no course development process …… moving too quickly (14)
Threat to jobs (8)	CBT inappropriate for graduate level courses (11)	This is NOT an innovation! (4)
Lack of time (7)	CBT not compatible with some learning styles (4)	How to keep course content and course technology current? (4)
Don't understand innovation	Less retention (3)	Technology may not be mature or stable enough (4)
How will I be involved?	CBT can be boring. How will students stay engaged? (2)	Students may lack necessary hardware and software
What will be expected of me?	Sacrificing educational quality for throughput and savings (11)	
How will current duties and responsibilities change when we take on new ones?	How to assess student learning? (8)	
Management will underestimate time and training requirements.	No credible comparison of CBT and classroom instruction has been presented. (10)	

The majority of concerns mentioned were in the *educational issues* category. More than half of these concerns dealt with the loss of classroom interaction (student-to-student and instructor-to-student) and loss of personal real-time feedback with technology-based courses. Many respondents felt that computer-based courses were inappropriate for graduate level management courses and are not convinced that technology-based courses will be as effective as classroom courses (relative to retention and learning outcomes). Also many respondents believed that this innovation will force DSMC to sacrifice education quality because of a business decision (so DAU can increase throughput and decrease costs). Another important area of concern in this category was student assessment, and many faculty had questions and reservations about how this assessment would be done.

Of the many responses to the open-ended question in the *implementation issues* category, the largest group of answers focused upon the need for more information and for training.

Another group of responses was extremely personal and fearful because some respondents considered technology-based education and training to be a clear and imminent threat to their jobs. The remaining responses in this category noted the excessive faculty commitments (in terms of workload and time) required for successful implementation of this innovation. Many respondents were unclear about their specific roles in technology-based education at DSMC.

In the *general management* category, the majority of concerns reflected great skepticism of DAU's ability to plan and manage this innovation for the entire consortium. Many respondents believed that DAU had unrealistic goals and was moving too quickly. More importantly, they felt that DSMC had little, if any, input to the DAU plan for the transition to technology-based education and training. Respondents reported that DAU had no specific requirements for course equivalency or quality and that DAU had no specific policy or standards on how to develop a computer-based course, or how to keep such a course current with rapidly changing subject matter. Several respondents had concerns about the maturity, compatibility, and availability of the technology required for students to take computer-based courses. Some respondents felt that students would be at a disadvantage if they did not have convenient access to appropriate hardware and software requirements (such as CD-ROM drives, internet connections, or world wide web capability).

Additional Findings

The "tailing-up" of Stage 6 in a concerns profile is a very important factor in a nonuser population (Hall, et al., 1986). Since the total faculty profile (Figure 7) and every other faculty subgroup profile in this study (Figures 10, 15, 20, and 25 and Appendices K, L, M, and N) exhibited this undesirable characteristic, the researcher conducted additional analysis to determine if this change in direction (negative slope to positive slope) or tailing-up characteristic was significant and thus meaningful to this study. Hall et al. (1986) state that "The Stage 6 tailing-up needs only to be seven to ten percentile points to be detectable in terms of the overall concerns of the individual" (p. 40). Of the nine Stages of Concern profiles calculated for this study, three profiles had a tailing-up Stage 6 with seven percentile points or higher, and the average value of all profiles was 6.0 percentile points. A separate ANOVA was conducted for differences between Stage 5 and Stage 6 scores for the entire population. Table 17 provides results from the ANOVA. The independent variables were the two stages of interest (5 and 6) and the dependent variable was the stage score for each individual respondent in the population. The ANOVA suggested a significant statistical difference in respondents' answers between Stage 5 and Stage 6, adding additional credibility to the tailing-up Stage 6 finding.

Table 17
ANOVA for Stage 5 and Stage 6 Difference

ANOVA for Stage 5 and Stage 6 Difference
Type III Sums of Squares

Source	df	Sum of Squares	Mean Square	F-ratio	P=value
Stage	1	488.893	488.893	11.34	0.0009 **
Residual	250	10778.008	43.112		

Dependent: scores

** p<<.05 Significant Difference Between Stages 5 and 6 for All Faculty

Another finding revealed that all sets of faculty subgroups had identical High Stage Scores and Second High Stage Scores except one. The group with less than 24 years federal service had a High Stage Score at Stage 0 and the group with more than 24 years had a High Stage Score at Stage 2. Upon examination of all data, the researcher discovered a similarity between the High Stage Score plot for military faculty (Figure 6) and the High Stage Score for those faculty with less than 24 years federal service. Both had the same highest two stages selected (Stages 0 and 2) and the corresponding scores were very close (between 32% and 37%). To investigate this phenomenon further, the researcher did a cross-tabulation between the civilian/military faculty subgroups and the federal service subgroups. The results, shown in Table 18,

Table 18
Cross-Tabulation of Civilian/Military and Federal Service Subgroups

	CIV	MIL
<24 Fed Exp:	**23**	**43**
>24 Fed Exp:	**49**	**11**

confirm that these faculty breakouts were not independent. The <24 year federal service subgroup was heavily weighted toward the military members (had almost twice as many military members as civilian members), and the >24 year subgroup was heavily weighted toward the civilian members (had more than four times as many civilian members as military members). Next, a comparison of the civilian subgroup High Stage Score plot (Figure 11) with the >24 year federal service subgroup (Figure 22) revealed similarity between them. Finally, a comparison of the two Second High Stage Scores were compared for the same conditions also indicated similarity. The Figure 21 plot represents the only time that Stage 0 was selected as the High Stage Score or the Second High Stage Score concern during this study, even though Stage 0 scores were always in the top three stages selected for every plot of frequency distribution (Figures 8, 9, 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 28 and 29). This finding is consistent with the nonuser profile in general, and also with every Stage of Concern profile tabulated in this study (Figures 7, 10, 15, 20, and 25).

Summary

This chapter presented quantitative and qualitative analyses of data from the Stages of Concern Questionnaires from the DSMC faculty about technology-based education and training. Results tended to indicate a homogeneous faculty, an important finding for subsequent interventions supporting this innovation. These analyses were next used in Chapter V to recommend strategic interventions and in Chapter VI to draw conclusions and make recommendations.

CHAPTER V

STRATEGIC INTERVENTIONS

Introduction

This chapter uses results of analyses in Chapter IV and information about technology use from Chapter II to determine a top-level intervention strategy for the Defense Systems Management College (DSMC) to facilitate the adoption of technology-based education in the Defense Acquisition University (DAU) courses. Specific interventions related to the research questions in this study are proposed.

Recommended Intervention Strategies at DSMC

For the context of this study, a strategic intervention could be described as a deliberate act of interference with a desired outcome during the life-cycle of the innovation. The objectives of the strategic interventions are to facilitate the adoption of the innovation (the transition to technology-based education at DSMC). Four top-level interventions are recommended for management at DAU and DSMC. These interventions were determined by quantitative and qualitative analysis of data from the Stages of Concern (SoC) Questionnaire and additional research that explored the use of technology in various institutions of higher education. The four strategic interventions are: a) *Training and Awareness,* b) *Organization and Management*, c) *Policy and Implementation*, and d) *Faculty Incentives*.

<u>Strategic Intervention Number One:</u> *Training and Awareness*

The first intervention strategy recommendation for DSMC is to directly address the greatest concerns and issues of its faculty toward technology-based education and training as discovered from the Stages of Concern Questionnaire. As seen in Figure 7 and discussed in Chapter IV, the greatest concern is in Stage 1 (Information). The data show that faculty have a fundamental lack of understanding about this innovation. They need specific information about the content and structure of the innovation itself, such as: What is it? What are the goals? What is the schedule? Who is involved? When is the training? What are the expectations? How will it be implemented? and, What is the level of management support and oversight? This lack of understanding has contributed to the negative bias of the DSMC faculty about the innovation because of underlying uncertainty and confusion about terms like "distance learning" and "technology-based education". These terms do not possess specific definitions; therefore, the specific applications and implementations must be made clear. Otherwise, faculty will continue to question the innovation and to try intentionally to think of better ways to accomplish the innovation's purposes.

The high awareness concerns (Stage 0) indicate that many DSMC faculty members have little knowledge about the existence of this innovation or about its applicability to them. The high personal concerns (Stage 2) result from the lack of awareness and lack of information discussed earlier. Since faculty don't understand much about the innovation or how it will affect them, the innovation's prospects represent an unknown about which they are fearful. Faculty seem most troubled about not knowing how this innovation will affect their daily activities or professional lives. To increase faculty awareness, DSMC management should work with DAU staff to host a series of briefings about this project. To improve faculty capability, DSMC management should establish a technology team of two representatives from each academic department to form a nucleus of knowledge about educational technology.

This technology team should receive specific training on the technologies to be used in the DAU courses and should be given dedicated time to develop expertise in these technologies by reducing their academic workload in other areas. After receiving initial training, the technology team will set up peer training sessions with other DSMC faculty. Department chairmen must reallocate workload within each department to allow for this additional time required for technology team members to learn these new technologies and to work with colleagues. To assist in this effort, DSMC should also establish a state-of-the-art educational technology laboratory to be used primarily by the technology team for training and course development. This laboratory should have two full-time staff positions for technical assistance.

<u>Strategic Intervention Number Two:</u> ***Organization and Management***

The second intervention strategy recommendation is for DSMC to establish itself as the lead school in the consortium for distance learning and educational technology. DSMC should initiate a Distance Learning and Educational Technology Advisory Group that will act as an advisor to the President of DAU. The DSMC Assistant Dean for Distance Learning and Educational Technology (proposed new position) would lead this group. This group would be an important asset to DAU as it consolidates the best ideas from all consortium schools in a collegial fashion and provides feedback to the President of DAU. Without this feedback, DAU may continue to make policy decisions in isolation without consulting the schools that must operationally implement these policies.

Research in this study found definite progress in the movement toward technology infusion into higher education, but in most institutions the effort is fragmented and has no formal support from top leadership. Instead, each college, department, or individual faculty member works independently to increase the effectiveness of academic courses through the use of technology. This situation is also true at DAU where no viable plan for implementing technology exists and no mechanism is in place for consortium schools (who offer many of the same courses) to work together in a decision-making capacity. Until technology efforts in education are specifically endorsed and managed from top leadership, these efforts will likely remain fragmented and inconsistent. The primary purpose of the DSMC technology advisory group is to address this problem.

<u>Strategic Intervention Number Three:</u> ***Policy and Implementation***

This research indicates that DSMC faculty's negative bias about the use of education and technology stems fundamentally from situational and management issues rather than technical issues. The current trend of downsizing in the Department of Defense has created a tension-filled environment of fear and anxiety. Management at DAU and DSMC has not alleviated any of this tension and has yet to develop a viable policy for distance learning and the use of educational technologies. Since many DAU courses are taught by more than one consortium school, the policy should come from consortium leadership (DAU) and should be developed in a team environment with active participation from all schools. This policy is critical to the success of the innovation and may shape the future of not only all eleven consortium schools (including DSMC), but also much training in the Department of Defense (DoD). In addition to the assignment of general responsibilities, the policy should include a disciplined approach to course development protocols and course configuration management procedures.

Once DAU policy for distance learning and educational technologies is approved and disseminated, a new implementation plan should quickly follow. The current DAU implementation plan (Defense Acquisition University, 1997) is not credible and clearly not achievable. For example, this plan shows that conversion of the first three courses (ACQ-101, ACQ-201, and TST-101) were to have been completed by July, 1997. None of these courses were successfully converted within the original schedule and now each will require at least two to three times as much effort to complete as originally planned. The current estimate for TST-101 completion is December 1998, and estimates for the others are similar (personal communication with LCOL William Eischens, TST-101 Course Director, April 2, 1998).

DAU should rescind the Technology-Based Education and Training Implementation Plan immediately and develop a more workable policy and a realistic plan for incorporating educational technologies throughout the consortium. When DAU developed the initial implementation plan in early 1997, there was no dialog or input from the key stakeholders in the process: the consortium schools and the DoD acquisition organizations. The schools provide the faculty who will develop and teach these courses and the acquisition organizations contain the students who will take these courses (acquisition workforce members who need the professional certification based on this education). Due to this lack of communication, the initial plan was based on flawed estimates and assumptions about cost trade-offs, educational concepts, and delivery modes. Also, faculty training, probably one of the most important ingredients, was not considered. As a result of these problems, the plan was never given serious consideration.

To achieve maximum buy-in and effectiveness, the next DAU implementation plan for educational technology should not be produced in isolation, which is what happened last time. The plan should be developed by a group with membership from all consortium schools, major acquisition organizations, and DAU. This plan should contain specific duties and responsibilities for DAU and all consortium schools, as well as realistic cost and schedule targets. The transition to technology-based courses will be a major change for all consortium schools and, if done properly, will enhance their technical capability and position them to better compete in the information technology arena. The criticality of the implementation plan demands careful consideration during development.

Strategic Intervention Number Four: ***Faculty Incentives***

The fourth intervention strategy recommendation is to provide faculty with incentives to encourage and sustain the use educational technologies. To implement this recommended intervention, DSMC leadership should take the following specific actions:

1. Establish a new Assistant Dean position working for the Dean of Faculty. The title of this position would be Assistant Dean for Distance Learning and Educational Technology, and the position's purpose is to provide visibility and stability for distance learning efforts and technology programs in the organization. This purpose is similar to one at American University where a new dean-level position is being created to direct the use of educational technologies. The primary job of this Assistant Dean at DSMC will be to serve as the Director of the Distance Learning and Educational Technology Advisory Group. Other responsibilities of this new position will be to coordinate activities with DAU and the consortium schools, to recommend policy to DSMC leadership (Dean of Faculty, Provost, and Commandant), to oversee the educational technology laboratory, and to manage the training and professional development of technology team. Technology team members will initially devote approximately 50% of their time to distance learning; therefore, the workload for the entire faculty needs to be realigned with more dedicated time for distance learning and technology infusion. The Dean of Faculty and the Assistant Dean of Faculty for Distance Learning and Educational Technology must work with department chairmen to realistically schedule future workload and course offerings. When faculty develop

technology-based courses, their efforts need to be recognized as additional workload and proper incentives and rewards must be provided. Without hiring additional faculty, this development will likely lead to a reduction in the traditional classroom courses offered by DSMC due to the additional workload on educational technologies.

2. Establish a competitive annual pay bonus for members of the technology team. A similar concept his being implemented at American University where technology expertise will be a factor in pay, rank, and tenure decisions.

3. Establish competitive research and travel grants for members of the technology team. Research and travel grants are now being used at George Mason University as faculty incentives to increase the use of educational technologies in classes, and George Washington University is also considering this option.

4. Provide members of the technology team with new computers and upgrades compatible with the educational technology laboratory. This plan will allow the technology team to work more productively and efficiently in their offices.

5. Provide faculty release time in exchange for work with educational technologies. This method of incentive is used at George Mason University and has been suggested for use at Radford and George Washington University.

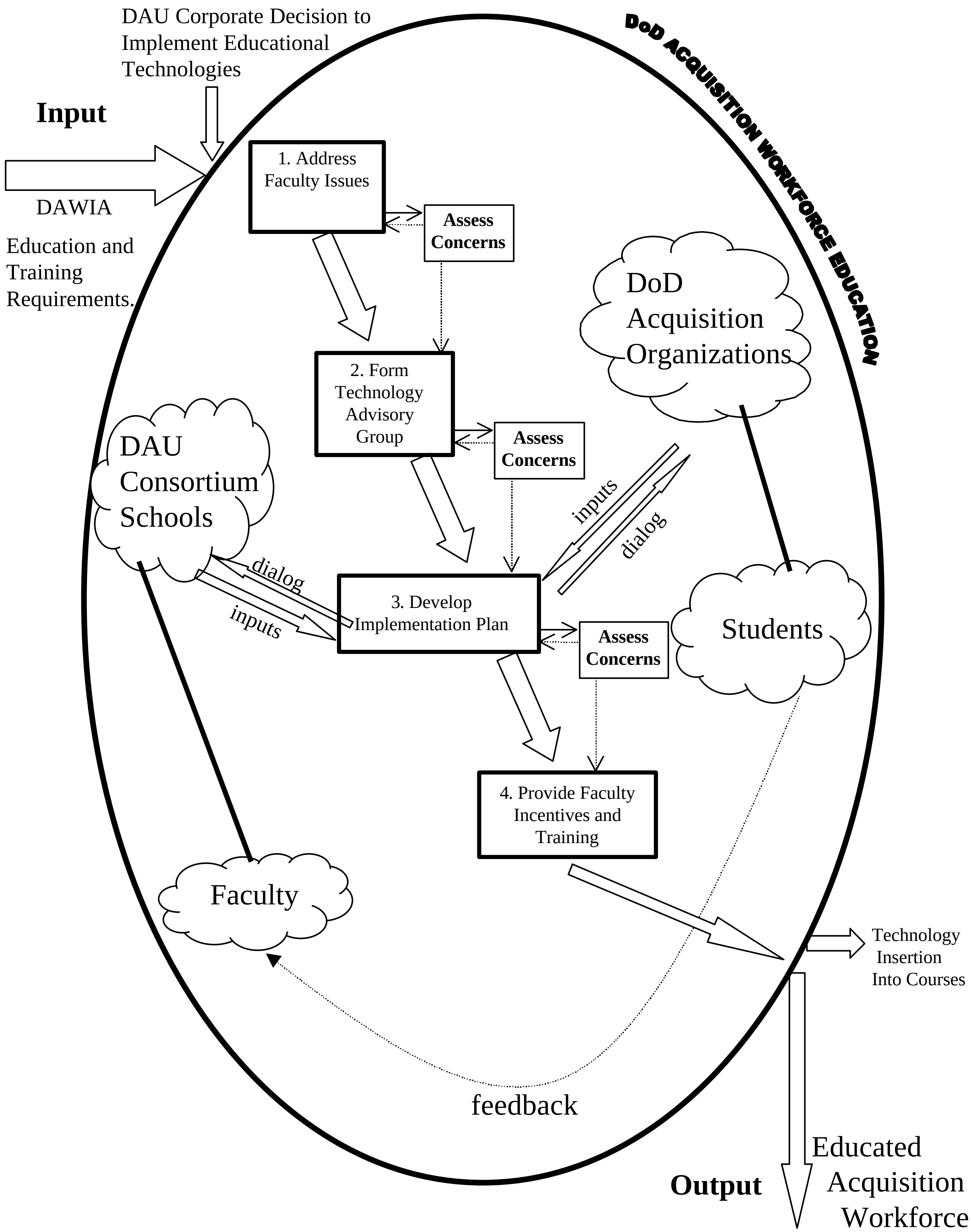
The technology team members are envisioned as highly motivated early adopters in the faculty. During the early stages of the innovation's life cycle, this team will lay the groundwork for the implementation of this innovation by providing a small, highly capable advocacy group. However, as the innovation becomes more widespread over the next two or three years and the use of educational technology becomes more normative and less experimental, the technology team's purpose may fade. More and more of the faculty will eventually become involved in preparing lessons, developing courses, and teaching courses using advanced technologies. The technology team could then be phased out as the use of educational technologies becomes "business as usual".

In summary, the recommended intervention strategies are:

1. DSMC needs to address faculty concerns and issues by providing its faculty with detailed information about the substance and structure of this innovation, including faculty responsibilities and opportunities. DSMC should establish a Technology Team with two faculty representatives from each academic department to serve as an advocacy peer group.
2. DSMC should initiate and chair a Distance Learning and Educational Technology Advisory Group with membership from all consortium schools.
3. DAU, in a partnership with DSMC, other consortium schools and DoD acquisition organizations, should establish a consortium-wide policy and implementation plan for technology-based education.
4. DSMC should provide faculty with these incentives to encourage the use of technology in its courses:
    a. Establish a new position: an Assistant Dean for Distance Learning and Educational Technology. This position will signify organizational endorsement for this innovation and provide key visibility and stability to the project.
    b. Provide competitive annual pay bonus to Technology Team members.
    c. Establish competitive research and travel grants for Technology Team members.
    d. Establish a state-of-the-art Educational Technology Laboratory.
    e. Provide members of the Technology Team with new computers, software, and network connections compatible with the Educational Technology Laboratory.
    f. Provide faculty release time in exchange for work with educational technologies.

Intervention Strategy Model for DSMC

Results of this study have enabled the researcher to develop an intervention strategy model for DSMC as that institution moves into technology-based courses. This model (Figure 30) focuses on the education of the DoD acquisition workforce necessary for professional certification. The inputs to the model are Defense Acquisition Workforce Improvement Act's



<u>Figure 30</u>. Intervention Strategy Model for DSMC

education and training requirements, and the output is an educated and more capable workforce.

The first step in the model (Strategic Intervention #1) calls for DSMC management to directly address the concerns and issues of faculty based on responses to the Stages of Concern survey. Presently DSMC faculty displays very high self concerns which must be addressed before impact concerns can become a priority. Faculty must progress from *self* concerns to *impact* concerns to become effective facilitators of technology-based education.

The second step in the model (Strategic Intervention #2) is for DSMC to establish itself as the lead school in the consortium for distance learning and educational technology. Since DSMC is doing the majority of the technology-based course conversion in the consortium, DSMC should initiate a Distance Learning and Educational Technology Advisory Group that will act as an advisor to the President of DAU. The DSMC Assistant Dean for Distance Learning and Educational Technology would lead this group and the group would have membership from each consortium school. This group would be the focal point in the consortium for resolving any technical problems or issues.

The third step in the model is for DAU to establish policy and implementation parameters. Once DAU has made the corporate decision to increase distance learning opportunities and integrate educational technologies into courses, the initial action to start the process is for DAU re-establish a top-level policy with general goals for the consortium schools (Strategic Intervention #3). The next step is for DAU to work as equal partners with the DoD acquisition commands, DSMC, and other consortium schools to produce an implementation plan. The high probability of conflicting goals and desires from these partners require that this be done with open and honest dialog from all involved. This strategy should increase the probability of success of this implementation plan when compared to DAU's initial plan.

The fourth step in the model (Strategic Intervention #4) requires DSMC to provide appropriate incentives and training for faculty as they adopt this innovation. Possible incentives for developing expertise with educational technologies would include extra pay, upgraded office computer suite, release time, travel grants, research grants, and summer stipends.

Between each step in the model, the faculty's concerns should be assessed to determine faculty reaction to the previous step and readiness to proceed to the next step. The resulting assessment would provide feedback to management which may need to repeat or modify an intervention, or even alter the entire model. After each feedback loop shown in the model, management should carefully consider the next move it will take.

As more DSMC faculty move through the model, more and more technology insertion will appear into DAU courses. Students from the acquisition organizations will then begin to experience these technology methods as they are exposed to these courses and provide feedback to through course evaluations and course critiques. With this feedback, course directors can work with DSMC leadership and DAU to optimize course delivery methodology.

Summary

This chapter provided intervention strategies for DSMC as that institution moves with DAU and other consortium schools to greater use of distance learning and educational technology. These strategies are summarized in the Intervention Strategy Model for DSMC (Figure 30) that gives a framework for movement through the technology adoption process. Next, Chapter VI uses results from Chapter IV and recommended intervention strategies from Chapter V to draw conclusions and make final recommendations.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This chapter summarizes the research, discusses conclusions based on findings in Chapter IV, and presents general recommendations for further research. The purposes of this study were to identify the Stages of Concern of the faculty at DSMC toward technology-based education and training, and to determine appropriate intervention strategies to assist DSMC through this change.

Summary

Large budget reductions and downsizing have been significant issues in the Department of Defense (DoD) since the mid-1990s. These reductions were not only targeted at military weapon systems and active duty personnel, but were also spread throughout the whole DoD. Education and training organizations in DoD were not spared from these budget cuts, even though the Defense Acquisition Workforce Improvement Act of 1990, which mandated more career development requirements for those in the DoD acquisition workforce, remains in effect. DoD is trying to solve this problem (of having to provide more education with less resources) by moving from traditional classroom delivery of courses to distance learning using technology-based methods, such as internet or world wide web computer-based formats.

The Defense Acquisition University (DAU), which manages all education and training for the acquisition workforce, has established a bold plan for implementing technology-based education methods into its consortium schools (Defense Acquisition University, 1997). The first four courses to transition to technology-based methods will be courses sponsored by the Defense Systems Management College (DSMC). DAU has tasked DSMC to begin the process and has hired contractors to do the necessary computer coding and to assist in course restructuring. This transition will take place during the current academic year with no reductions in the traditional classroom courses, requiring DSMC to implement a very heavy workload. DSMC had no voice concerning which courses would be first transitioned, which technology methods would be used, or who would be responsible for specific elements of the transition. For example, the educational institution responsible for subject matter content, student assessment, student remediation, and the administration of these technology-based courses remains unclear. This ambiguity caused considerable resentment at DSMC because all these courses had been originally developed and sponsored by DSMC. Even though other consortium schools teach some of these courses, DSMC has always maintained control of them.

In addition, many DSMC professors apparently feel that the ongoing pressures of DoD downsizing coupled with successful conversion of these courses to technology-based delivery methods would eventually jeopardize their jobs. DAU has unofficially proposed to release about 75% of the entire consortium faculty by the time all 80 courses are on-line in approximately three years (personal communication with Professor Richard H. Reed, Dean of Faculty, October 10, 1997). DSMC faculty anticipates that the teaching workload will increase, even after the transition is complete; therefore, they do not understand this proposed reduction. In fact, DSMC leadership believes that these losses in personnel will probably not happen; however, this issue seems to be a great source of resentment and irritation for faculty. The special status of DSMC professors as excepted service federal employees (DoD civil service employees without traditional civil service job protection) make them extremely vulnerable to layoffs.

Change in any military structure (such as DSMC) can be easily mandated, but, as in this case, not as easily assimilated or accepted by the people within the organization who must ultimately take the actions necessary for successful implementation. If not handled properly, this lack of acceptance could result in detrimental changes to the organization (DSMC), the students (DoD acquisition workforce), and the entire Department of Defense. This particular change at DSMC (moving to technology-based education) may be difficult, especially when coupled with possible fear and resentment in the current climate at DSMC. This combination of factors invites resistance and opposition to the DAU transition plan (Lippitt, Watson, and Westley, 1958). Based on the Concerns-Based Adoption Model (CBAM), the DSMC faculty will have concerns not only about the merits of this innovation, but also about the institutional process of implementation. A more complete understanding of the issues and concerns of DSMC faculty can assist DSMC leadership in establishing and executing effective interventions.

As discussed in Chapter 1, the CBAM model has been used extensively in educational settings to measure Stages of Concern and to track the use of educational innovations throughout their life-cycle. This study presents the first use of CBAM with the faculty of a DoD educational institution. The Stages of Concern Questionnaire (Hall, et al., 1986) was administered to the DSMC faculty during the month of January, 1998. Since the Stages of Concern Questionnaire (developed for faculty use in an educational environment) was unmodified, reliability and validity were preserved. The survey instrument did include the following open-ended question: *When you think about technology-based education and training, what concerns you the most?*

The population in this survey was the entire faculty of the Defense Systems Management College (N=135). Surveys, personally delivered to faculty offices, were accompanied by an endorsement letter from the Provost. The usable response rate was 93% (N=126), and 88% of those who returned questionnaires (N=113) also answered the open-ended question in Section B of the instrument (Appendix E). This study analyzed individual data, aggregate data for the whole population, and group data for each faculty subgroup corresponding to research questions. Chapter IV discussed the answers to all five research questions, which required that this study accomplish the following two things: (1) determine the Stages of Concern for the DSMC faculty (total profile) about technology-based education and training, and (2) determine the differences in Stages of Concern between various faculty subgroups based on civilian or military status, teaching experience, length of federal service, or experience with technology-based courses.

Demographic variables in the survey were used to describe the population and sort respondents into proper categories to address research questions. The Stages of Concern Quick Scoring Device and norming table provided the methodology for determining individual Stages of Concern Profiles and group Stages of Concern Profiles (Hall, et al., 1986). Next the High Stage Score and Second High Stage Score methods provided graphic analysis of the Stages of Concern, followed by a more detailed statistical analysis using analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA). A series of ANOVAs determined whether or not the various groups differed in their individual stage scores, and MANOVAs identified if there were significant differences in stage scores while accounting for correlation among variables and avoiding the possibility of type-I errors. The open-ended question provided a more subjective assessment of faculty issues and concerns (Newlove and Hall, 1976). Responses were tabulated and arranged into these three categories: educational issues, personal issues, and general management issues. Analysis and interpretation of these answers provided additional insight and understanding about the statistical Stages of Concern data.

The primary finding of this research shows that faculty at DSMC displayed a clear "nonuser" profile. As noted by Hall et al. (1986), the nonuser profile is characterized by highest concerns in the early stages (Stages 0, 1, and 2) and lowest concerns in the later stages (Stages 4, 5, and 6). The composite Stages of Concern Profile for all faculty (Figure 7) shows very high relative intensity at each of the first three stages, with Stage 1 being the highest at 88. Stage 2 was very close to Stage 1 at 87, and Stage 0 was also very close at 86. The high Stage 1 score indicated, above all else, a desire and need from the faculty for more information about the innovation. The high Stage 2 score shows high faculty concern about the personal impact of this innovation upon their professional activities and daily schedules. These results (Stage 2 essentially as high as Stage 1) reflect an unhealthy scenario because the faculty are just as concerned with the personal changes and challenges resulting from this innovation as they are with gaining understanding and mastery of the innovation (Hall, et al., 1986).

The high Stage 0 score indicates either low interest or low knowledge about this innovation. The faculty reported much lower management concerns (Stage 3) and even lower impact concerns (Stages 4, 5, and 6); however, the profile clearly tails up at Stage 6. This tailing-up of Stage 6 (Stage 6 score higher than Stage 5 score) is very undesirable because it represents resistance to the innovation and a desire to replace or modify the innovation. Hall et al. (1986) report that "any tailing-up of Stage 6 concerns on a nonuser profile should be taken as a potential warning about resistance to this innovation from the respondents" (p. 40). This pattern in the composite faculty Stages of Concern Profile was essentially the same for every faculty subgroup analyzed (Figures 10, 15, 20, and 25).

The High Stage Score and Second High Stage Score methods of analysis provided additional insight from the data. For the total faculty, Stage 2 was the most often reported as highest stage score (42%), and Stage 1 was most often reported as the second highest stage score (44%) as shown in Figures 2 and 3. Figures 2 and 3 show clearly that the High Stage Score and Second High Stage Score plots are consistent with the nonuser profile since the first three stages were selected at a much higher relative frequency than the last four stages. This same pattern of

High Stage Scores and Second High Stage Scores was exhibited by every faculty subgroup examined, as defined by the research questions.

The data from the DSMC faculty was highly consistent, and all comparative Stages of Concern Profiles exhibited similar trends. When faculty were divided into appropriate subgroups pertaining to research questions, analyses (ANOVAs and MANOVAs) demonstrated no significant statistical differences in Stages of Concern among subgroups. This finding is consistent with 13 years of research by Hall and other members of the Research and Development Center for Teacher Education. Hall et al.(1986) report that "It has been of interest to us, in our research to date, that there have been no outstanding relationships between standard demographic variables and concerns data. Rather, as our research unfolds, there is increasing support for the hypothesis that 'interventions' and 'conditions' associated with the implementation effort are more critical than age, sex, teaching experience, etc." (p. 52).

Qualitative assessment of responses to the open-ended question confirmed previous analyses and provided deeper subjective understanding. The majority of the open-ended responses (101 of 155) dealt with informational concerns, which is consistent with the composite faculty Stages of Concern Profile where Stage 1 was the highest stage. Similarly, the next highest category of open-ended responses also matched the second highest concern stage. Twenty-one percent (33 of 155) were centered around personal issues, which was also consistent with the composite faculty Stages of Concern Profile where Stage 2 was the second highest concern stage. The researcher had some difficulty in subjectively categorizing the remaining open-ended responses into concern stages because correspondence was unclear. Many of the remaining 21 responses criticized DAU management, questioned the maturity of available technology for the acquisition workforce, or expressed concerns about the ability to keep courses current with respect to content as well as rapidly evolving technology.

Nearly one-third of faculty (32%) expressed a general lack of confidence in the educational quality of this innovation. The common theme of these responses was concern about the loss of interaction (professor-to-student and student-to-student) and lack of personal real-time feedback in a computer-based course. Many respondents focused specifically on the great value of students sharing experiences and knowledge with each other as they openly discuss course materials in class. Many faculty thought they would lose this important learning opportunity in the computer-based format, as currently envisioned by DAU.

In general, the open-ended questions displayed a definite negative bias and lack of faculty acceptance of this innovation (at least for the 113 faculty who responded to this portion of the survey). Faculty were clearly unconvinced that DAU could successfully manage the implementation of this change, even though the change was mandated by DAU. Faculty felt that DSMC would eventually be held responsible for course design, development, and administration, even though they had no commitments from DAU regarding future faculty manning levels and resources. In addition, DAU has unilaterally decided the delivery modes (specific technologies to be used) in the first four technology-based courses with no participation from DSMC, which currently teaches these courses. No trade-off analysis was presented, leaving the DSMC faculty a pervasive feeling that DAU decisions were prioritized to decrease the cost of doing business at the expense of educational quality.

Several faculty comments expressed concern about DAU's "poor planning," "unrealistic goals," "lack of a clear requirements process," "non-existent course development process," and that DAU was "moving too quickly". Subjective analysis of the open-ended questions validates the tailing-up of Stage 6 in all faculty nonuser profiles. DSMC faculty expressed considerable resistance to this innovation and directly questioned many of DAU's management decisions regarding implementation.

Conclusions

Both objectives of this research have been accomplished. The Stages of Concern of DSMC faculty were determined for the faculty as a whole, as well as for pertinent faculty subgroups corresponding to research questions. Stages of Concern profiles clearly categorize DSMC faculty as a nonuser group with a negative outlook toward the innovation. Consistent with this finding, demographic information showed little faculty experience with technology-based education and training courses. This study used four statistical methods to quantitatively analyze data from the Stage of Concern Questionnaire (SoCQ): SoCQ Profile analysis, High/Second High Stage Score analysis, analysis of variance (ANOVA), and multivariate analysis of variance (MANOVA). In addition, qualitative analysis of the responses to the open-ended question provided further validation of the results gained from the statistical analysis noted in Chapter IV. Based on research results, specific interventions were proposed for DSMC (Chapter V) and an Intervention Strategy Model (Figure 30) was presented.

Results of this study are in agreement with many years of previous experience with the Stages of Concern instrument and the Concerns-Based Adoption Model. Hall et al. (1986) conclude that standard demographic variables have little correspondence with measured concerns data. This study found no differences in DSMC faculty concerns due to teaching experience, tenure with the Federal Government, civilian or military status, or personal experience with technology-based courses. Hall et al. (1986) learned from extensive research with CBAM not only that the organizational actions and interventions which frame the implementation of an innovation are more critical than demographic variables, but also that the "state of the user system" was the most critical factor in understanding stages of concern (p. 52). The user system in this research study includes the DSMC faculty and will soon include the students from the acquisition workforce (when the first technology-based courses go on-line in the fall of 1998) (Hord, et al., 1987).

Several institutional factors in this user system have contributed to the negative outlook of DSMC faculty toward this innovation. Among these factors are: (1) uncertainty of faculty manning levels following implementation of the innovation, (2) fear of losing faculty jobs, (3) lack of proper training to prepare for this change, (4) misunderstanding and mistrust of DAU motives, (5) lack of confidence in DAU ability to manage implementation, and (6) loss of the high educational quality in the current DSMC courses. It seems clear that these factors make the "state of the user system" far from optimal. The data does not show that the DSMC faculty is anti-technology or opposed to using technology where appropriate. On the other hand, DSMC faculty is very skeptical of DAU's wholesale transition plan to technology-based education and training, because they feel it is based only on cost savings without regard for educational quality, and because it was produced without input from key stakeholders in the process.

Recommendations for Further Research

This research study has focused on one dimension of the Concerns-Based Adoption Model: the Stages of Concern of DSMC faculty toward this innovation. If course development schedules are met, four technology-based courses will be on-line by the end of 1998 and many others will be undergoing transformation. Since DAU's plan includes other consortium schools also becoming heavily involved in distance learning technologies, to establish a baseline of data is important. Therefore, this researcher recommends that the SoCQ be administered to every other DAU consortium school faculty as soon as possible, because all other schools will soon be undergoing similar transitions as DSMC. In approximately one year (Summer, 1999) additional research should be initiated for four reasons:

(1) to assess developmental progression of the faculty Stages of Concerns Profile at DSMC and other consortium schools, which should be shifting to the right with more familiarity and usage. The DSMC faculty initially had a nonuser profile, with the highest concerns in Stages 0, 1, and 2 (self concerns). As the faculty gain familiarity and understanding of the innovation, the self concerns should subside, and management concerns (Stage 3) should begin to increase. Only after management concerns are adequately addressed and reduced will impact concerns (Stages 4, 5, and 6) begin to increase. The Stages of Concerns Questionnaire should be administered again in approximately one year to verify that developmental progress is taking place.

(2) to investigate the second dimension of the CBAM model: Innovation Configuration (Hall, Wallace, & Dossett, 1973). Once on-line, these new technology-based courses will begin to develop a history of usage and the configuration of these courses will begin to evolve. The goal of the configuration changes is to make the courses more effective by using post-course feedback and recommendations from students and faculty for improvement. Fast-paced technology development, as well as continually changing course content, is likely to result in major configuration changes on an annual basis, if not more frequently. Innovation Configuration also refers to professors and institutions using different implementation techniques during development and use of this innovation (Hall and Loucks, 1981). Therefore, configuration changes may be either structural changes in the course content or implementation changes dealing

with administrative procedures or delivery techniques when using technology-based courses. Hall and Loucks (1981) developed an Innovation Configuration component checklist to help identify the individual components of an innovation and the variations an educator might use while implementing the innovation.

(3) to track the Levels of Use of the innovation after implementation. Levels of Use is the third dimension of the CBAM model (Hall, Wallace & Dossett, 1973) which provides a proven technique for monitoring the behaviors of innovation users. The Levels of Use dimension identifies behaviors and does not focus on the attitudinal or motivational aspects of the user. Instead, this dimension defines the operational actions of the users throughout the innovation adoption life cycle. Hall, Loucks, Rutherford, and Newlove (1975) developed procedures to assist in identification of various Levels of Use among users. Research into Levels of Use would provide insight into how effective faculty members are in developing facilitation skills with this innovation.

(4) to assess and track student performance during on-line courses. Student performance should be compared with those taking traditional course offerings. Student critique of on-line coursers and the delivery process should also be tracked to look for trends and to develop corrective action when necessary.

Summary

This study has contributed to the base of knowledge about concerns theory, and more specifically, the Concerns-Based Adoption Model. This research represents the first use of the Stages of Concern Questionnaire (SoCQ) in an educational institution within the Department of Defense. Analysis of the Stages of Concern data from DSMC faculty clearly places the faculty at the nonuser position along the continuum of SoC profiles. This knowledge not only assists DSMC management in properly addressing the present situation, but also establishes the basis for future tracking of the innovation and the organization throughout the innovation's life cycle. Subsequent movement of faculty through the Stages of Concern or shifts in DSMC's organizational mission will demand reassessment of concerns and modification of intervention strategies.

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Appendix A

Defense Acquisition Workforce Career Fields

Acquisition Logistics

Auditing

Business, Cost Estimating, and Financial Management

Communications – Computer Systems

Contracting (Including Construction)

Industrial and/or Contract Property Management

Manufacturing and Production (Includes Quality Assurance)

Program Management

Purchasing and Procurement Technician

System Planning, Research, Development, and Engineering

Test and Evaluation

(DAU Catalog, 1998, Ch. 4, p. 27)

Appendix B

Defense Acquisition University Consortium Schools

Air Force Contracting/Acquisition Training Center (AFCATC), Lackland Training Facility

Air Force Institute of Technology (AFIT)

Army Logistics Management College (ALMC)

Defense Contract Audit Institute (DCAI)

Defense Logistics Agency Civilian Personnel Support Office (DCPSO)

Defense Systems Management College (DSMC)

Industrial College of the Armed Forces (ICAF)

Information Resources Management College (IRMC)

Naval Center for Acquisition Training (NCAT)

Naval Facilities Contracts Training Center (NFCTC)

Naval Postgraduate School (NPS)

Naval Warfare Assessment Division (NWAD)

Office of the Assistant Secretary of the Navy (OASN), Research, Development and Acquisition (RD&A/APIA-PP)

(DAU Catalog, 1998, Chapter 1, p. 4)

Appendix C

Defense Systems Management College
Academic Departments

Acquisition Policy

Contractor Finance

Contract Management

Earned Value Management

Education

Funds Management

Logistics Management

Managerial Development

Manufacturing Management

Principles of Program Management

Systems Engineering Management

Software Management

Test and Evaluation

(DSMC Catalog, 1998)

Appendix D

Stages of Concern about the Innovation

0 Awareness: Little concern or involvement with the innovation is indicated

1 Informational: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about himself/herself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects, and requirements for use.

2 Personal: Individual is uncertain about the demands of the innovation, his/her inadequacy to meet those demands, and his/her role with the innovation. This includes analysis of his/her role in relation to the reward structure of the organization, decision making, and consideration of potential conflicts with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be reflected.

3 Management: Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.

4 Consequence: Attention focuses on impact of the innovation on student in his/her immediate sphere of influence. The focus is on relevance of the innovation for students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes.

5 Collaboration: The focus is on coordination and cooperation with others regarding use of the innovation.

6 Refocusing: The focus is on exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternatives to the proposed or existing form of the innovation.

(Hall and Hord, 1987, p. 60)

Appendix E

TECHNOLOGY-BASED EDUCATION & TRAINING SURVEY

Section A. DEMOGRAPHIC DATA

Circle or fill in the blank with information that best describes you.

1. **Gender:** Male or Female (circle one) 2. **Age: ______** 3. **Present Status:** Civilian or Military (circle one)

4. **Ethnic Background:**
African American, Asian, Caucasian, Hispanic, Other ________________________________ (circle one or fill in)

5. **Functional Specialty (Academic Department):**
AP, CF, CM, EV, ED, FM, LM, MD, MM, PM, SE, SM, TE, other ________ (circle one or fill in)

6. **Years of Faculty Experience (DSMC or other): ______** 7. **Total Years of Federal Service: ______**

8. **Highest Education Level:** Bachelors, Masters, Doctorate (circle one), **Major: ____________________________________**

9. **Number of technology-based courses taken (for credit or certification): ______**

10. **How would you rate your general comfort level in utilizing computer technology?**
0 1 2 3 4 5 6 7
Uncomfortable ----------------------------Very Comfortable (circle one)

11. **How would you rate your general comfort level in taking a computer-based course?**
0 1 2 3 4 5 6 7
Uncomfortable ----------------------------Very Comfortable (circle one)

12. **How would you rate your general comfort level in designing a computer-based course?**
0 1 2 3 4 5 6 7
Uncomfortable ----------------------------Very Comfortable (circle one)

13. **How would you rate your comfort level with respect to tenure and job security with the Federal Government?**
0 1 2 3 4 5 6 7
Uncomfortable ----------------------------Very Comfortable (circle one)

14. **Circle MBT1 type (if known)**

ISTJ	**ISFJ**	**INFJ**	**INTJ**
ISTP	**ISFP**	**INFP**	**INTP**
ESTP	**ESFP**	**ENFP**	**ENTP**
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**

Section B. YOUR CONCERNS

The following question asks for your opinion about Technology-Based Education & Training.
Please be as specific as possible in your answer.

WHEN YOU THINK ABOUT TECHNOLOGY-BASED EDUCATION & TRAINING,
WHAT CONCERNS YOU MOST?

1

Section C. CONCERNS QUESTIONNAIRE

The purpose of this questionnaire is to determine what concerns people have using, or thinking about using, various programs during the innovation adoption process. The items were developed from typical responses of school and college teachers who ranged from "no knowledge at all" about various programs to "many years experience" in using them. Therefore a good part of the items on this questionnaire may appear to be of little relevance or irrelevant to you at this time. For the completely irrelevant items, please circle "0" on the scale. Other items will represent those concerns you do have, in varying degrees of intensity, and should be marked higher on the scale.

For example:

This statement is very true of me at this time.	0 1 2 3 4 5 6 (7)
This statement is somewhat true of me now.	0 1 2 3 (4) 5 6 7
This statement is not at all true of me at this time.	0 (1) 2 3 4 5 6 7
This statement seems irrelevant to me.	(0) 1 2 3 4 5 6 7

Please respond to the items in terms of your present concerns or how you feel about your involvement or potential involvement with Technology-Based Education & Training. Please think of Technology-Based Education & Training in terms of your own perception of what it involves.

Since the questionnaire is used for a variety of innovations, the name Technology-Based Education & Training never appears. However, phrases such as "the innovation," "this approach," and "the new system" all refer to Technology-Based Education & Training.

Thank you for taking time to complete this task.

2

CONCERNS QUESTIONNAIRE

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

1. I am concerned about students' attitudes toward this innovation.	0	1	2	3	4	5	6	7
2. I now know of some other approaches that might work better.	0	1	2	3	4	5	6	7
3. I don't even know what the innovation is.	0	1	2	3	4	5	6	7
4. I am concerned about not having enough time to organize myself each day.	0	1	2	3	4	5	6	7
5. I would like to help other faculty in their use of the innovation.	0	1	2	3	4	5	6	7
6. I have a very limited knowledge about the innovation.	0	1	2	3	4	5	6	7
7. I would like to know the effect of reorganization on my professional status.	0	1	2	3	4	5	6	7
8. I am concerned about conflict between my interests and my responsibilities.	0	1	2	3	4	5	6	7
9. I am concerned about revising my use of the innovation.	0	1	2	3	4	5	6	7
10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.	0	1	2	3	4	5	6	7
11. I am concerned about how the innovation affects students.	0	1	2	3	4	5	6	7
12. I am not concerned about this innovation.	0	1	2	3	4	5	6	7
13. I would like to know who will make the decisions related to this new approach.	0	1	2	3	4	5	6	7
14. I would like to discuss the possibility of using the innovation.	0	1	2	3	4	5	6	7
15. I would like to know what resources are available if we decide to adopt this innovation.	0	1	2	3	4	5	6	7
16. I am concerned about my inability to manage all that the innovation requires.	0	1	2	3	4	5	6	7
17. I would like to know how my teaching or administration is supposed to change.	0	1	2	3	4	5	6	7
18. I would like to familiarize other departments or persons with the progress of this new approach.	0	1	2	3	4	5	6	7

CONCERNS QUESTIONNAIRE

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

19. I am concerned about evaluating my impact on students.	0	1	2	3	4	5	6	7
20. I would like to revise the innovation's instructional approach.	0	1	2	3	4	5	6	7
21. I am completely occupied with other things.	0	1	2	3	4	5	6	7
22. I would like to modify our use of the innovation based on the experience of our students.	0	1	2	3	4	5	6	7
23. Although I don't know about this innovation, I am concerned about things in the area.	0	1	2	3	4	5	6	7
24. I would like to excite my students about their part in this approach.	0	1	2	3	4	5	6	7
25. I am concerned about time spent working with nonacademic problems related in this innovation.	0	1	2	3	4	5	6	7
26. I would like to know what the use of the innovation will require in the immediate future.	0	1	2	3	4	5	6	7
27. I would like to coordinate my effort with others to maximize the innovation's effects.	0	1	2	3	4	5	6	7
28. I would like to have more information on time and energy commitments required by this innovation.	0	1	2	3	4	5	6	7
29. I would like to know what other faculty are doing in this area.	0	1	2	3	4	5	6	7
30. At this time, I am not interested in learning about this innovation.	0	1	2	3	4	5	6	7
31. I would like to determine how to supplement, enhance, or replace the innovation	0	1	2	3	4	5	6	7
32. I would like to use feedback from students to change the program.	0	1	2	3	4	5	6	7
33. I would like to know how my role will change when I am using the innovation.	0	1	2	3	4	5	6	7
34. Coordination of tasks and people is taking too much of my time.	0	1	2	3	4	5	6	7
35. I would like to know how this innovation is better than what we have now.	0	1	2	3	4	5	6	7

Section D. ADDITIONAL COMMENTS

Take this opportunity to voice any additional comments. **Your comments may refer to any item on the questionnaire or any other issue or concern you may have regarding Technology-Based Education & Training**

Thank you for your cooperation.

Appendix F

Soc Questionnaire Items by Stage

<u>Item</u> **<u>Stage 0, Awareness</u>**

3 I don't even know what the innovation is.

12 I am not concerned about this innovation.

21 I am completely occupied with other things.

23 Although I don't know about this innovation, I am concerned about things in the area.

30 At this time, I am not interested in learning about this innovation.

<u>Stage 1, Informational</u>

6 I have a very limited knowledge about the innovation.

14 I would like to discuss the possibility of using the innovation.

15 I would like to know what resources are available if we decide to adopt this innovation.

26 I would like to know what the use of the innovation will require in the immediate future.

35 I would like to know how this innovation is better that what we have now.

<u>Stage 2, Personal</u>

7 I would like to know the effect of reorganization on my professional status.

13 I would like to know who will make the decisions in the new system.

17 I would like to know how my teaching or administration is supposed to change.

28 I would like to have more information on time and energy commitments required by this innovation.

33 I would like to know how my role will change when I am using the innovation.

<u>Stage 3, Management</u>

4 I am concerned about not having enough time to organize myself each day.

8 I am concerned about conflict between my interests and my responsibilities.

16 I am concerned about my inability to manage all the innovation requires.

25 I am concerned about the time spent working with nonacademic problems related to this innovation.

34 Coordination of tasks and people is taking too much of my time.

Stage 4, Consequence

1 I am concerned about students attitudes toward this innovation.

11 I am concerned about the innovation affects students.

19 I am concerned about evaluating my impact on students.

24 I would like to excite my students about their part in this approach.

32 I would like to use feedback from students to change the program.

Stage 5, Collaboration

5 I would like to help other faculty in their use of this innovation.

10 I would like to develop working relationships with our faculty and outside faculty using this innovation.

18 I would like to familiarize other departments or persons with the progress of this new approach.

27 I would like to coordinate my efforts with others to maximize the innovation's effects.

29 I would like to know what other faculty are doing in this area.

Stage 6, Refocusing

2 I now know of some other approaches that might work better.

9 I am concerned about revising my use of the innovation.

20 I would like to revise the innovation's instructional approach.

22 I would like to modify our use of the innovation based on the experience of our students.

31 I would like to determine how to supplement, enhance, or replace the innovation.

(Hall, George, and Rutherford, 1986, p. 25)

Appendix G

SoC Quick Scoring Device

A

Date:____________________________

Site:____________SS#:________________

Innovation:_________________________

B

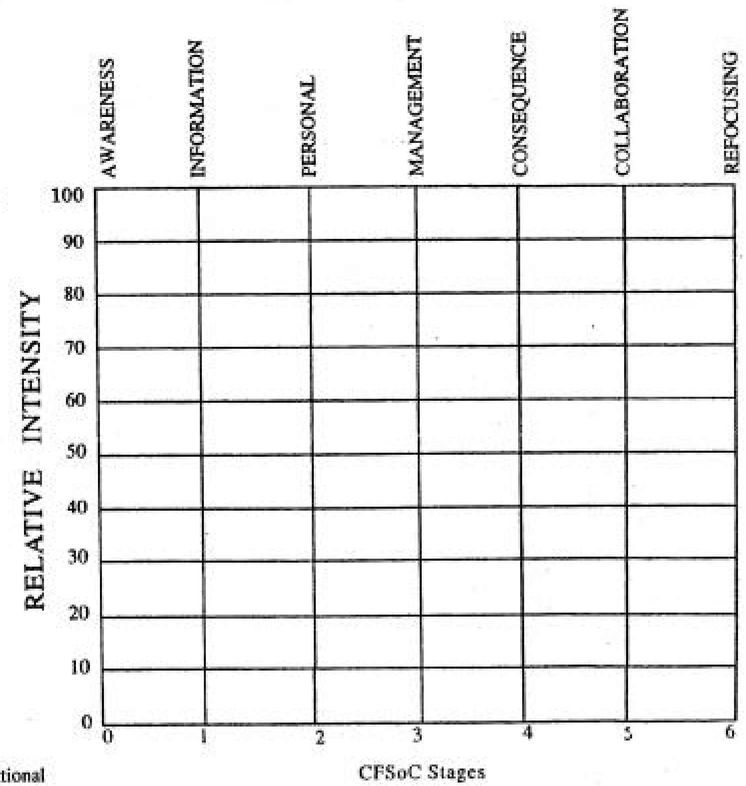
Stage	0	1	2	3	4	5	6
	3____	6____	7____	4____	1____	5____	2____
	12____	14____	13____	8____	11____	10____	9____
	21____	15____	17____	16____	19____	18____	20____
	23____	26____	28____	25____	24____	27____	22____
	30____	35____	33____	34____	32____	29____	31____
Raw Score Totals **C**	____	____	____	____	____	____	____
Percentile Scores **E**	____	____	____	____	____	____	____

D

Five Item Raw Scale Score Total	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
0	10	5	5	2	1	1	1
1	23	12	12	5	1	2	2
2	29	16	14	7	1	3	3
3	37	19	17	9	2	3	5
4	46	23	21	11	2	4	6
5	53	27	25	15	3	5	9
6	60	30	28	18	3	7	11
7	66	34	31	23	4	9	14
8	72	37	35	27	5	10	17
9	77	40	39	30	5	12	20
10	81	43	41	34	7	14	22
11	84	45	45	39	8	16	26
12	86	48	48	43	9	19	30
13	89	51	52	47	11	22	34
14	91	54	55	52	13	25	38
15	93	57	57	56	16	28	42
16	94	60	59	60	19	31	47
17	95	63	63	65	21	36	52
18	96	66	67	69	24	40	57
19	97	69	70	73	27	44	60
20	98	72	72	77	30	48	65
21	98	75	76	80	33	52	69
22	99	80	78	83	38	55	73
23	99	84	80	85	43	59	77
24	99	88	83	88	48	64	81
25	99	90	85	90	54	68	84
26	99	91	87	92	59	72	87
27	99	93	89	94	63	76	90
28	99	95	91	95	66	80	92
29	99	96	92	97	71	84	94
30	99	97	94	97	76	88	96
31	99	98	95	98	82	91	97
32	99	99	96	98	86	93	98
33	99	99	96	99	90	95	99
34	99	99	97	99	92	97	99
35	99	99	99	99	96	98	99

Concerns Based Systems International

F



Appendix H

Joyce Pollard, Ed.D.
Director
Office of Institutional Communications
and Policy Services
Southwest Educational Development
Laboratory
211 E. Seventh St.
Austin, TX 78701-3281

Dear Dr. Pollard:

I am requesting permission to reprint/reproduce (in the case of videotapes) the following:

The Stages of Concern Questionnaire (SoCQ) - - 200 copies

I intend to use the reprinted/reproduced information in the following way/with the designated audience (please attach examples):

I am conducting research at Virginia Tech University, and I am Studying faculty concerns and issues relative to a transition to Technology-Based Education and Training (computer-based courses). I will administer the SoCQ survey to 200 faculty members of the Defense Systems Management College.

In the case of a videotape, I agree to duplicate the tape in its entirety without editing, splicing, or obliterating SEDL's copyright. I further agree to use or distribute the copies at no cost to the designated audience(s). Finally, I agree to give appropriate attribution (citations or reference) to the Southwest Educational Development Laboratory.

Name: Paul Alfieri

Address: Defense Systems Management College
DSMC/FD-TE
9820 Belvoir Road, Suite G38
Ft. Belvoir, VA 22060-5565

Telephone Number: (703) 805-5282 phone, (703) 805-3183

E-mail: alfierip@dsmc.dsm.mil

****

APPROVED: Joyce S. Pollard **DATE:** 12/19/97

Appendix I

UNIVERSITY OF NORTHERN COLORADO

COLLEGE OF EDUCATION
EDUCATIONAL LEADERSHIP AND POLICY STUDIES
• EDUCATIONAL LEADERSHIP
• COLLEGE STUDENT PERSONNEL ADMINISTRATION

GREELEY, COLORADO 80639
OFFICE (970) 351-2861
FAX (970) 351-2312

13 December 1997

Paul Alfieri
Defense Systems Management College
9820 Belvoir Road
Suite G38
Fort Belvoir, VA 22060-5565

Dear Professor Alfieri:

Thank you for your interest in our work with the Concerns Based Adoption Model and more specifically Stages of Concern. I am pleased that you are interested in using the SoCQ in your dissertation study.

You have my permission to make copies of the Stages of Concern for your dissertation study. Please refer to the SoCQ technical manual and make the appropriate citations to it and our book, Change in Schools Facilitating the Process.

If you have any questions in regard to data interpretation, please let me know.

I am most interested in learning about the findings from your study.

Sincerely yours,

Gene E. Hall

Gene E. Hall, Professor
Educational Leadership

QUALITY • DIVERSITY • PERSONAL TOUCH

COMMITTED TO AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY

Appendix J

DEPARTMENT OF DEFENSE

DEFENSE SYSTEMS MANAGEMENT COLLEGE
OFFICE OF THE COMMANDANT
9820 BELVOIR ROAD
FORT BELVOIR, VIRGINIA 2206-5565

FD **6 January 1998**

MEMORANDUM FOR TEACHING FACULTY

SUBJECT: Technology-Based Education and Training Survey

1.We are beginning one of the most significant changes in many years at DSMC. In FY98 we plan to offer our first technology-based courses via the Internet or CD-ROM format. Three courses are now in development (SAM-101, TST-101 and ACQ-101) and several others will begin development shortly. Some of you have already been involved in this transition to technology-based education and training, but many of you have not. We all need to better understand this method of course delivery and development, because it will be an important part of the future of DSMC. I am asking that you complete the attached survey to get your views on technology based education and training at DSMC.

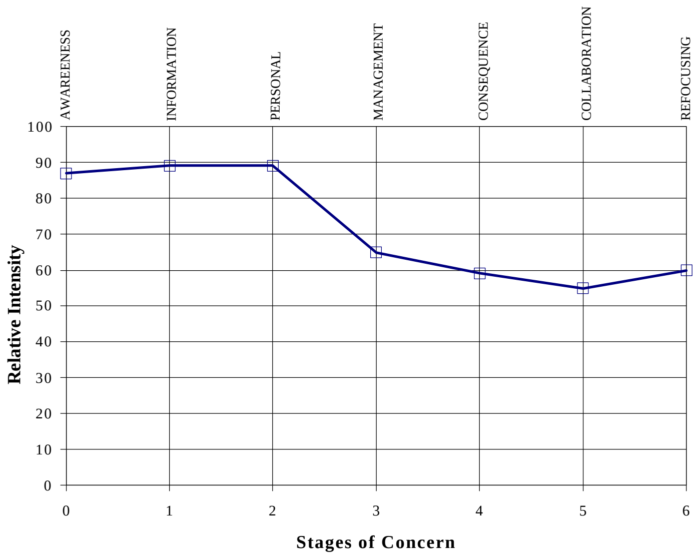
2. You are the ones who will make this work, because you are the experts on developing, delivering, and maintaining DoD acquisition courses. Therefore, I need to know how you feel about this effort. Regardless of your experience with computer-based courses, I want to hear your opinions. This is an opportunity to express your issues and concerns, and although your response is confidential, I strongly urge your participation. Without your help, we may lack important information about what this change means to you. Clearly, you are the ones who understand the significance of this innovation to the way DSMC does business.

3. The survey will take only about 15 minutes to complete and I am confident that data from it will help us develop the best intervention strategies to prepare you for this change. The goal of this survey is to assist faculty by addressing their issues as we facilitate the transition to computer-based courses for the acquisition workforce. Thank you for your help in providing us this information. The points of contact for administration of this survey are Paul Alfieri (805-5282) and Tony Scafati (805-5424).

RICHARD REED
Provost and Deputy Commandant

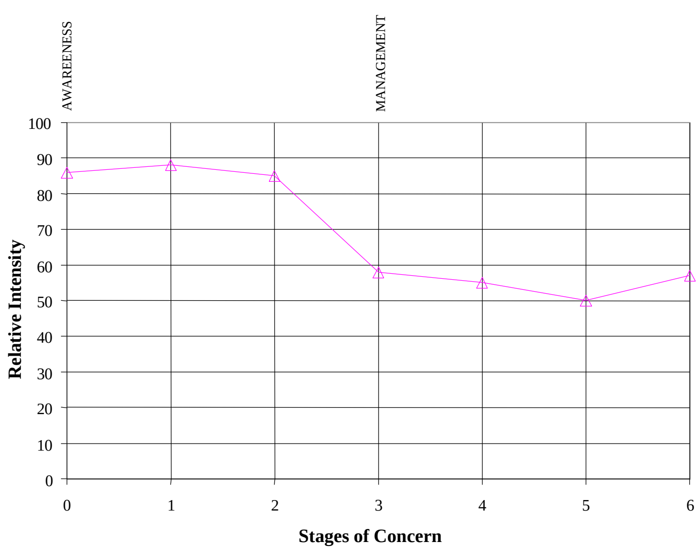
Attachment

Appendix K



	0	1	2	3	4	5	6
□ Civilian Faculty	87	89	89	65	59	55	60

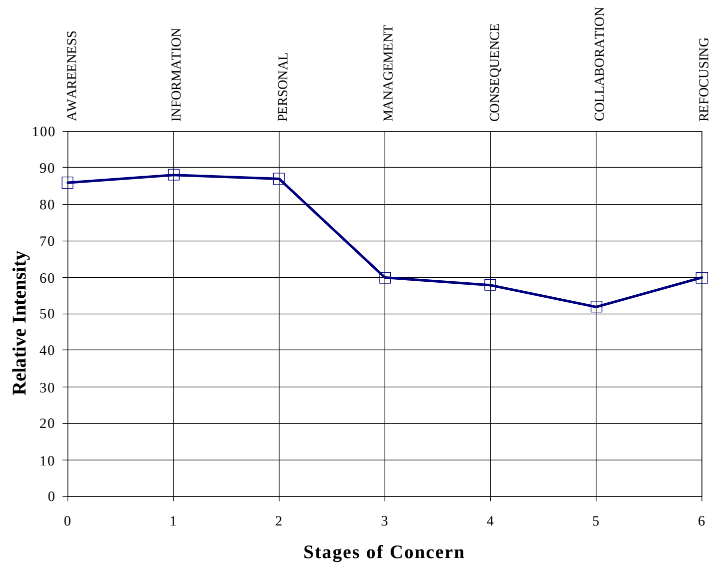
SoC Profile for Civilian Faculty (N=72)



	0	1	2	3	4	5	6
△ Military Faculty	86	88	85	58	55	50	57

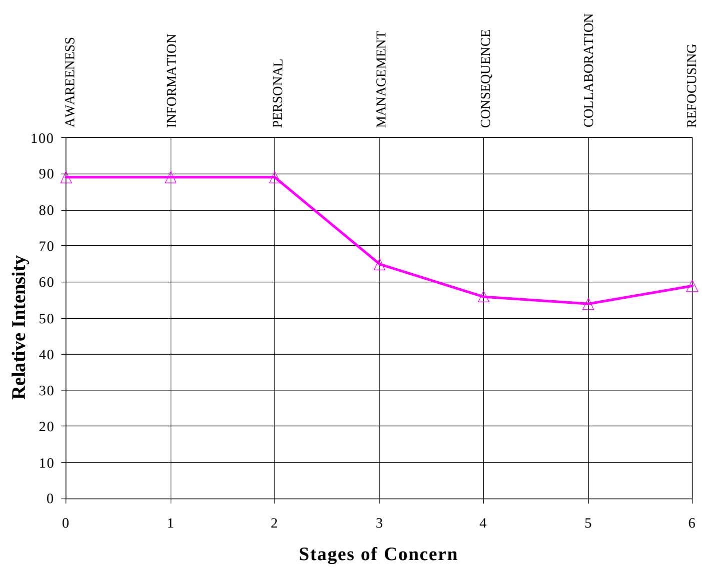
SoC Profile for Military Faculty (N=52)

Appendix L



□ <10 yrs exp	86	88	87	60	58	52	60

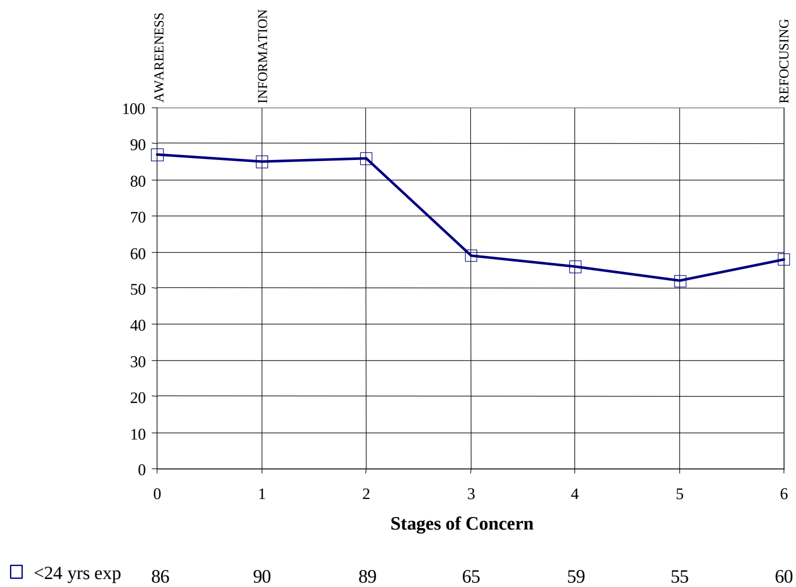
SoC Profile: <10 yr Faculty Exp (N=81)



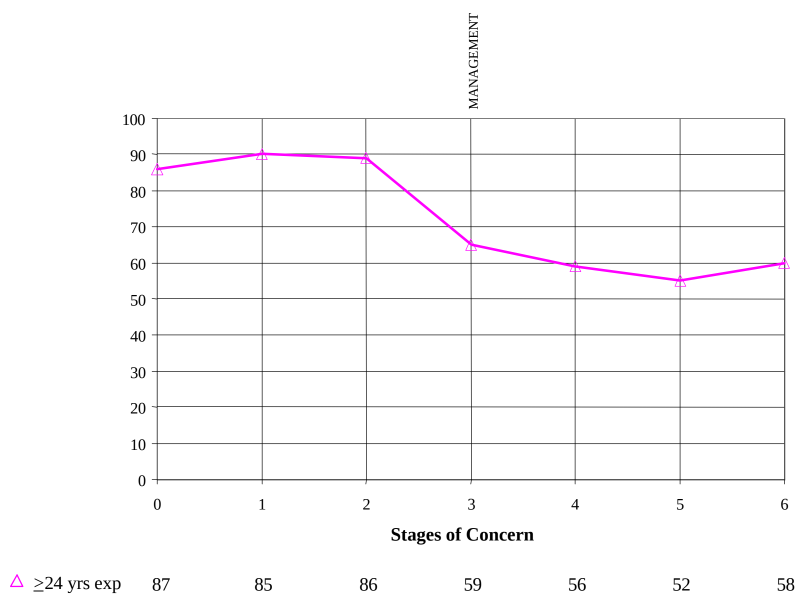
△ ≥10 yrs exp	89	89	89	65	56	54	59

SoC Profile: >10 yr Faculty Exp (N=45)

Appendix M

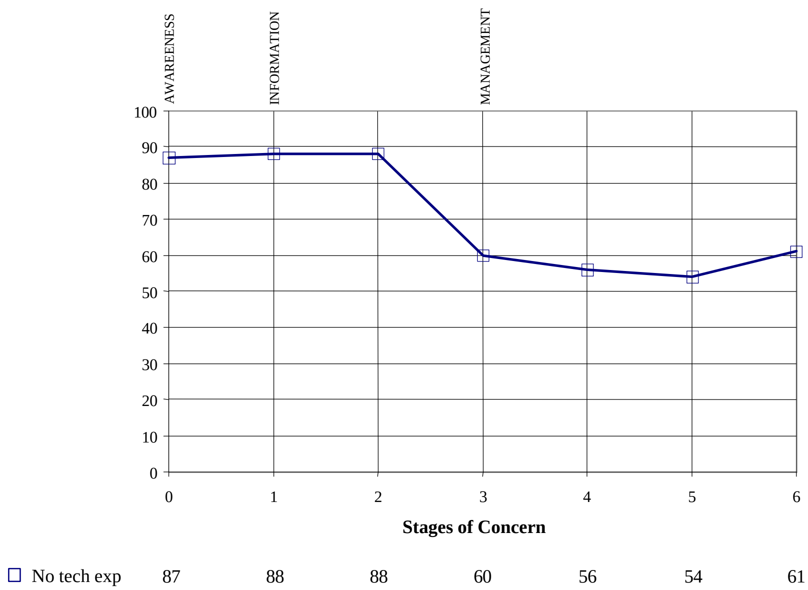


SoC Profile: <24 yr Federal Service (N=66)

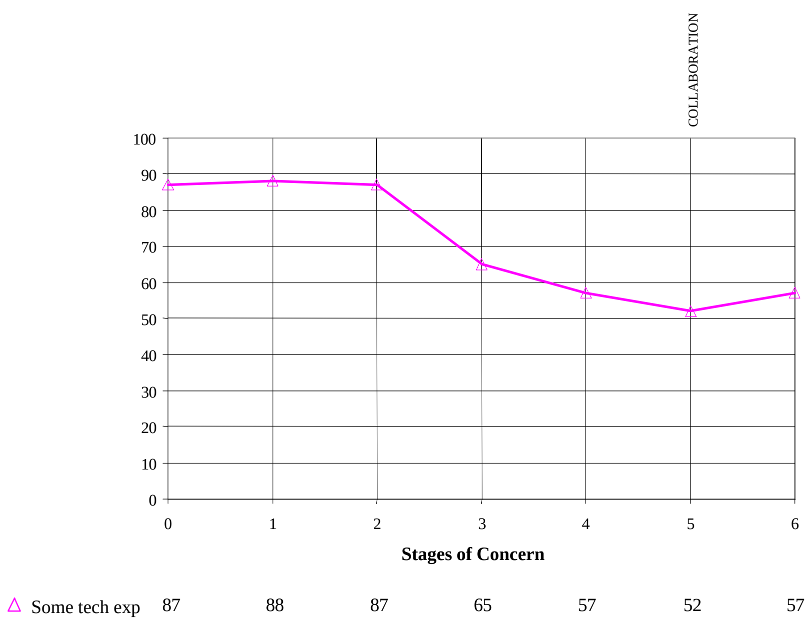


SoC Profile: >24yr Federal Service (N=60)

Appendix N



SoC Profile: No Tech-Base Course Exp. (N=81)



SoC Profile: Some Tech-Base Course Exp. (N=45)

Vita
of
Paul Allen Alfieri

Received a Bachelor of Science in Mathematics from the United States Naval Academy in 1969. Served as a pilot and systems engineer in the United Stated Navy until 1989. Received two free trips to Southeast Asia, several unit awards, and the Navy Achievement Medal. While on active duty, received a Master of Science in Aeronautical Engineering from the Naval Postgraduate School in 1976 and a Master of Science in Administration (Science and Technology) from The George Washington University in 1981. Received a Certificate of Advanced Graduate Studies from Virginia Polytechnic Institute and State University in 1996 and a Doctor of Education from Virginia Polytechnic and State University in 1998.

Served as assistant professor in the Electrical Engineering Department at the United States Naval Academy from 1979-1982 and adjunct professor at Anne Arundel Community College from 1980-1982. Served as course director and professor of engineering management at the Defense Systems Management College from 1991-1996 and as Chairman of the Test and Evaluation Department from 1996-1998. At DSMC, taught hundreds of adult professionals from the Department of Defense acquisition workforce.