AN EVALUATION OF THE EDUCATIONAL EFFECTIVENESS OF A RELATIONAL COURSE COMPARED TO SINGLE TOPIC COURSES OFFERED BY THE MANAGEMENT DEPARTMENT OF THE UNITED STATES AIR FORCE ACADEMY

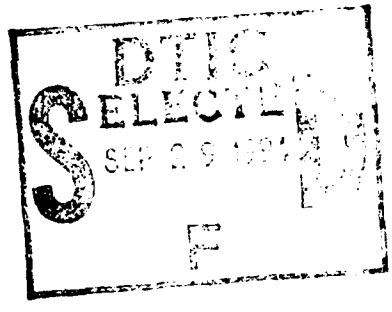
THESIS

Kevin M. Kosefeski
Second Lieutenant, USAF
AFIT/GLM/LAR/94S-24

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

AFIT/GLM/LAR/94S-24



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THESIS

Presented to the Faculty of the School of
Logistics and Acquisition Management of the Air Force
Institute of Technology Air Education and Training Command
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Kevin M. Kosefeski, B.S.
Second Lieutenant, USAF

September 1994

Acknowledgments

Before anyone else, I would like to thank God for all the blessings he has bestowed upon me. Second, I would like to express my appreciation to my thesis advisors, Dr. David K. Vaughan and Lieutenant Colonel Wayne G. Stone. Dr. Stone provided the guidance and structure which enabled me to transform the concept of this research into the product it has become. I am equally indebted to Dr. Vaughan for allowing me to choose my own path and learn from my mistakes.

I would also like to express my appreciation to the Management Department of the United States Air Force Academy. I am especially grateful to Colonel Charles J. Yoos II, for providing me with the idea of educational evaluation. I am also thankful for the assistance rendered by Major Rick Abderhalden, which helped me invaluably in completing this study.

I also need to thank my friends and classmates who helped me survive my time in graduate school. Specifically, I am grateful to Lieutenant Colonel Donald O'Hare for teaching me SAS and Kelly Cooley for teaching me patience.

Finally, I would like to acknowledge the inspiration of my recently departed Grandfather, Mr. Warren R. VanDeVort. It was his example which taught me the importance of education and the benefits of perseverance, the two values which carried me through this research effort.

Kevin M. Kosefeski

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Abstract

This study compares the educational effectiveness of two different methods of teaching three senior-level management courses at the United States Air Force Academy. The first method, known as relational instruction, combined Management Information Systems (MIS), Marketing, and Strategic Management into one three hour course worth nine credits. The team of instructors used a variety of delivery methods to present material. The second method of instruction employed single topic courses covering the same three topics as the relational course, taught by single instructors in one hour blocks using mostly lecture to deliver material.

The literature review covered Bloom's taxonomy of educational objectives, the theory of self-efficacy, and the validity of self-evaluations. A forty item questionnaire was developed based on the Management Department's objectives for senior-level courses. The instrument was administered to all 74 senior management majors in the Academy's Class of 1994; 60 were returned (a response rate of 81%). No difference was found between the educational effectiveness of the teaching methods. It was recommended the Department base the continuation or elimination of the relational course on criteria other than educational effectiveness and that the Management Department adopt a more structured approach to experimental courses.

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I. INTRODUCTION

Background

The United States Air Force Academy encompasses 18,000 acres on the eastern slope of the Rocky Mountains, outside of Colorado Springs, Colorado. The Academy is the United States Air Force's four year undergraduate institution, similar to the Navy's Annapolis or the Army's West Point. According to the 1993-1994 Air Force Academy Catalog, "The mission of the United States Air Force Academy is to develop and inspire air and space leaders with vision for tomorrow."

To accomplish its mission, the staff at the Academy concentrates on "four broad areas, or 'pillars' of instruction: professional military training, academics, athletics, and a sound code of character and honor" (Air Force Academy Catalog, 1993: 4). Throughout their four year stay, cadets receive training and evaluation in each of the four areas. Cadets graduate with a Bachelor of Science in the academic discipline of their choice and commissions as Second Lieutenants in the United States Air Force.

General Issue

The Management Department at the United States Air Force Academy is one of nineteen academic departments which provide instruction for the 4,200 cadets who attend the Air Force's undergraduate institution. Each academic department is chaired by an Air Force Colonel who oversees the number and types of courses that the department will offer. The department heads answer to the Dean of the Air Force Academy, an Air Force Brigadier General. Although the Dean is responsible for the overall curriculum at the Academy, latitude is granted to the department heads in determining their contribution to that curriculum.

In the summer, the department heads meet with the Dean to review changes to the curriculum. Minor changes, such as a change in course objectives, occur every year and need not be approved by anyone other than the appropriate department head. Larger changes, such as offering a new course or changing the method in which material is delivered, require a consensus of the department heads, or the Dean's approval during the summer meeting. Department heads are given the flexibility to experiment with large magnitude changes, but the change must be formally approved before it can be mandated department-wide. An outline of the suggested course sequence for management majors is included in Appendix 6.

At the time this study was undertaken, the Management Department was approaching the point where it had to decide whether or not to implement the experimental course department-wide. For the past three years the department had been experimenting with an innovative approach to teaching three management courses traditionally taught to students their senior year. The experimental course, titled *The Management Capstone Course*, combined Management Information Systems (MIS), Marketing, and Strategic Management into one course worth nine credits. The experimental course was given the designation MGT 472Y, 475Y, 491Y. The "MGT" designation signifies that it is a course offered by the management department. The 400 series designation signifies that it is a course offered to seniors, and the Y designation signifies that it is an experimental course.

Those management majors not selected for the experimental course were enrolled in MGT 472: Strategic Management, MGT 491: Management Information Systems, MGT 475: Marketing, or MGT 477: Production Operations Management classes taught in the traditional manner, at separate times, in separate classrooms. Each of these courses was worth three credits. To complete the requirements for a Bachelor of Science Degree in Management, cadets had to receive a passing grade in either the experimental course or three of the functional courses.

The experimental course was taught by three instructors, each with expertise in at least one of the three functional areas: strategy, marketing, or MIS. Three other instructors from the management department observed, experienced and critiqued the learning environment for the department. The three additional instructors needed to be familiar with the pedagogy of the experimental class in case the department head made the decision to mandate the class for all management majors the following year. The three primary teachers in the experimental class also taught the functional courses during the same semester.

The main difference between the single topic courses and the experimental course, besides the team teaching approach, was a pedagogy described by the management faculty as "relational instruction." Relational instruction combines lecture, field trips, and case study/presentation to teach material across disciplines and encourages students to take responsibility for their own learning (McKinney Interview, 1994). Many graduate schools of business have already begun combining subjects and encouraging greater teamwork (Greising, 1989; Mason, 1992; Bongiorno, 1993).

In addition to the unique pedagogy, the experimental course differed from other undergraduate courses at the Air Force Academy in the number of credits awarded and the amount of time required per class. Every other school day, students in the relational course attended a three hour

block of lecture, seminar, and/or class discussion. The relational course was worth nine credit hours. Almost every other course offered at the Academy, including the functional courses offered by the management department, was worth three credits and required the students to meet every other day for fifty minutes.

The experimental course was first offered in the Spring of 1992 and approximately thirty senior management majors were randomly chosen to participate. Course critiques filled out at the end of the semester indicated that almost half of the students in the experimental course recommended taking the three courses separately (McKinney Interview, 1994).

Several changes were made before the course was offered the following spring. The end of course critiques changed as well. There were forty-six students in the experimental course the second time it was offered, in the spring of 1993, and only 13% said they would definitely not recommend the experimental course (McKinney and others, 1993: 37). The relational course completed its third year of experimentation with the end of the Spring semester of 1994. The forty-four students who completed the most recent experimental course represented approximately 60% of the Class of 1994's management majors.

After three years of experimentation and refinement, the Management Department is attempting to determine which

of the two pedagogical methods, relational or traditional, is more effective. It hopes to determine whether instructors should teach the final semester of the management curriculum using the relational method, or end the experimental course and continue with only the single topic courses. To assist in accomplishing this decision, this research provides an evaluation of educational effectiveness using the results of a self-evaluation questionnaire.

Problem Statement

This research addresses the following question: How does the teaching effectiveness of the relational course compare to that of the single topic courses offered by the Management Department at the United States Air Force Academy?

Research Objectives

The objectives of this research are to: 1) determine the Management Department's objectives for senior level courses, 2) select a tool for measuring the effectiveness of the two different course types in meeting the department's objectives, and 3) evaluate the management majors in the Academy Class of 1994 to determine if there are significant

differences, in terms of the department's objectives, between the cadets enrolled in the relational course and those enrolled in the single topic courses separately.

Basis for the Research

An award-winning paper submitted by the instructors of the relational course to the 1993 Instructional Innovation Award Competition stated, "we are still learning about the process of evaluation"(McKinney and others, 1993: 16). To determine the educational effectiveness of the alternate forms of instruction, one must first define the term effectiveness. The American Heritage Dictionary defines *effective* as "Producing the desired impression or response" (439). In the context of the teaching methods evaluated by this research, the Management Department's desired response will be used to judge effectiveness.

To determine the Management Department's desired response from the cadets enrolled in its senior level courses, the curriculum director/coordinator for the department was interviewed. According to the curriculum director, the department's goals for the senior level courses were basically the same as the objectives for the relational course as outlined in the paper submitted to the 1993 Instructional Innovation Awards Competition (McKinney Interview, 1994).

These three objectives were 1) to create a complex milieu of information across a broad spectrum of topics where students have to integrate, synthesize, and evaluate information from these topics, 2) to encourage students to take responsibility for their learning, and 3) to use assignment and assessment methods that encourage students to learn teamwork and to learn from each other within their groups (McKinney and others, 1993: 2).

Scope/Limitations

This research will evaluate the Management Department's alternate pedagogies based on the results of a survey distributed to the seventy-four cadets who were management majors in the United States Air Force Academy's Class of 1994. Forty-four were enrolled in the relational course, while the remaining thirty were enrolled the single topic courses taught in the traditional manner. The results of this research are intended for the use of the Management Department of the United States Air Force Academy, but may be applicable to other academic departments at civilian undergraduate schools of business.

The educational outcomes set by the Dean of the Air Force Academy (Appendix 1) serve as a framework for the goals of each academic department. While many of these goals might be found in a civilian institution, Outcome 7,

"officers who can apply their knowledge and skills to the unique tasks of the military profession," is unlikely to be found outside the military academies. If organizations set different goals, they may need to employ different methods to reach them.

Another consideration is the level of cognitive ability of the average student at the Air Force Academy. Because the Academy has higher than average minimum SAT and ACT admission requirements, the Cadet Wing does not contain a representative sample of the American population. This research did not consider the effect of intelligence or institutional goals on the subjects studied. The goals are the same for both populations and the students are a relatively homogenous group academically, by virtue of their presence at the Academy. Therefore, civilian schools' curriculum directors should be careful before applying the results of this research to their own organizations. They should look at the goals of the Management Department at the Air Force Academy and the cognitive ability of the cadets, as measured by standardized tests such as the SAT, and determine if these factors are relevant before adopting the conclusions of this research to their program.

Thesis Overview

Chapter II reviews research relating to Bloom's taxonomy, self-assessment theory, and self-efficacy. Chapter III explains the methodology used to accomplish the research objectives previously presented. Included in Chapter III is a description of the statistical techniques used to analyze the data. Chapter IV summarizes the research findings and analysis. This chapter includes a number of hypothesis tests and discussion of the problems encountered during data collection and analysis. Finally, Chapter V provides the conclusion of the research. This chapter includes a summary of two teaching options as well as the results of the data analysis and recommendation as to which pedagogy the Management Department should adopt for teaching its capstone courses. Chapter V also recounts difficulties encountered during the research and suggests areas for follow on studies.

II. LITERATURE REVIEW

Introduction

This literature review provides an overview of research and theory of Bloom's taxonomy of educational objectives, an evaluation of self-appraisals, and self-efficacy. Bloom's taxonomy is reviewed because the Management Department's objectives, for senior level courses are based on the taxonomy and these objectives serve as the basis for comparing the two teaching methods. Self-appraisal and self-efficacy are reviewed because they relate to the instrument chosen for evaluating the two courses.

Bloom's Taxonomy

Throughout the late 1940s and into the mid-1950s a committee of college and university educators, chaired by Dr. Benjamin S. Bloom, developed a taxonomy of educational objectives for use in categorizing the desired outcome of education programs. Now commonly known as Bloom's Taxonomy, the classification system divided learning into three major domains: (1) cognitive, (2) affective, and (3) psychomotor. First described in 1956, the taxonomy has allowed educators to develop a common language with which they can communicate. As will be seen in this chapter, the taxonomy has demonstrated a potential for more than description.

Background of Bloom's Taxonomy

In 1956, a committee of college and university educators published the first volume of a two-volume set of a classification system for educational goals. Edited by Benjamin S. Bloom, Taxonomy of Educational Objectives: Handbook I: Cognitive Domain provided education professionals with a much-needed standardized vocabulary and theory of an educational hierarchy. The classification methodology is now popularly known as Bloom's taxonomy. Although many education practitioners and researchers are familiar with the concept, the full range of benefits the taxonomy provides may not be realized by most.

Perhaps the best way to relate the importance of the education taxonomy is to borrow a more familiar classification system from another discipline. Some time during their education careers, many students have been enrolled in a biology class in which they were exposed to the classification system biologists use to categorize living creatures. The taxonomy started with kingdom, then further subdivided categories into phylum, class, and so on. Learning the difference between the plant and animal kingdoms was perhaps our first exposure to a formal taxonomy. The biological taxonomy provided practitioners in the field of biology with not only a standardized vocabulary, but also a framework to aid in the understanding

of the organization and interaction of the organisms they study.

Analogous to the biology taxonomy, the taxonomy developed by Bloom and the committee of educators he worked with gave the practitioners and researchers of education a tool that served as more than a classification system. The taxonomy was divided into three domains: (1) cognitive, (2) affective, and (3) psychomotor.

The first book written about the taxonomy, published in 1956, concentrated on the cognitive domain. The authors decided to publish the cognitive domain first because it was, "the domain in which most of the work in curriculum development has taken place and where the clearest definitions of objectives are to be found phrased as descriptions of student behaviors" (Bloom and others, 1956: 7). The second book, Taxonomy of Educational Objectives: Handbook II: Affective Domain, was not published until 1964, almost ten years later. The affective domain categorizes educational objective in terms of the feeling, interest, and commitment. The psychomotor domain, which emphasizes muscular or motor skills, while being recognized by the taxonomy, has not been developed due to the minimal amount of time devoted to it in the education system.

The Cognitive Domain

The cognitive domain "includes those objectives which deal with recall or recognition of knowledge and the development of intellectual abilities and skills" (Bloom and others, 1956: 7). Most educators have focused their attention on this domain, and thus it is the best defined and least controversial of the three domains (Krathwohl, Bloom, and Masia, 1966: 8). The domain is subdivided into six major classes: (1) knowledge, (2) comprehension, (3) application, (4) analysis, (5) synthesis, and (6) evaluation.

The classes of the cognitive domain are theoretically hierarchical in nature, with *knowledge* the simplest objective and *evaluation* the most complex objective. "[T]he objectives in one class are likely to make use of and be built on the behaviors found in the preceding classes in this list" (Bloom and others, 1956: 7). A brief description of the objectives found in each class allows us to better understand the nature of the relationship of the classes in the cognitive domain.

The first level of the cognitive domain, knowledge, involves the recall of facts and ideas as well as the recognition of patterns and settings. The main psychological process at work at this level is remembering. Bloom's taxonomy further categorizes objectives into

(1) knowledge of specifics, (2) knowledge of ways and means of dealing with specifics, and (3) knowledge of the universals and abstractions in a field. Knowledge is typically measured using a multiple choice test (Bloom and others, 1956: 78).

Knowledge in Bloom's taxonomy is a necessary prerequisite for the second level, comprehension. The essay test is typically administered to test for achievement of the comprehension objective (Bloom and others, 1956: 98). The students operating at the comprehension level know what is being communicated and can make use of that material without necessarily relating it to other material. The taxonomy subdivides this level into (1) translation, (2) interpretation, and (3) extrapolation.

The third class, application, is a higher level of understanding which makes use of both knowledge and comprehension. The taxonomy defines application as "the use of abstractions in particular and concrete situations" (Bloom and others, 1956: 205). The difference between application and the previous level is that a student at the comprehension level can use an abstraction when its use is specified, while a student at the application level will make use of an abstraction without being prompted. Application is not sub-divided by Bloom's taxonomy.

Bloom's fourth level, analysis, is the first example of more abstract reasoning. A student at the analysis level is

able to break down material into its constituent parts and see the relationship of the parts in a way not obvious upon initial inspection. Again, due to the hierarchical nature of the taxonomy, one can find elements of the previous three classes in the analysis level. Three categories make up the analysis level: (1) analysis of elements, (2) analysis of relationships, and (3) analysis of organizational principles.

The fifth level of the taxonomy, synthesis, appears to be the opposite of the previous level. Synthesis involves the combination of separate elements to form a whole. The three sub-divisions that make up the synthesis category are: (1) production of a unique communication, (2) production of a plan, or proposed set of operations, and (3) derivation of a set of abstract relations. There have been questions as to whether or not synthesis requires analysis. A model developed by Madaus, Woods, and Nuttall (1973) has proposed that the two classes of the domain are not necessarily hierarchical. Instead they branch out like the letter Y. After the level of application, the analysis and synthesis represent separate but not hierarchical skills. The Y theory does not invalidate the model, but instead adds another dimension to consider.

The final level of the cognitive domain is evaluation. Evaluation is defined as making judgments about the value of material. It includes both quantitative and qualitative

judgments about the extent to which material satisfy criteria. The two categories which make up the evaluation level are: (1) judgments in terms of internal evidence, and (2) judgments in terms of external criteria.

The evaluation level is the most controversial of the taxonomy (Kunen, Cohen, and Solman, 1981; Smith, 1968). Because of the subjectivity of value judgments, it is difficult to measure the level of evaluation reached or determine at what point the judgment was made. Even the authors of the taxonomy conceded an ambiguity with its placement at the top of the hierarchy. "It is quite possible that the evaluative process will in some cases be the prelude to the acquisition of new knowledge, a new attempt at comprehension or application, or a new analysis or synthesis" (Bloom and others, 1956: 185).

Although placed in the cognitive domain, the evaluation objective has elements of the affective domain as well. It is important to point out that the objectives are not concrete and must be considered in relation to one another.

The Affective Domain

The affective domain of Bloom's taxonomy includes "objectives which emphasize a feeling tone, an emotion, or a degree of acceptance or rejection" (Krathwohl, Bloom, and Masia, 1966: 8). The authors of the taxonomy had a much greater difficulty developing the affective domain objectives. "There was no doubt that the affective domain represented a more difficult classification problem than the cognitive domain" (Krathwohl, Bloom, and Masia, 1966: 13). Despite the difficulty, the taxonomy was developed for the affective domain and the educational objectives were divided into five major classes: (1) receiving, (2) responding, (3) valuing, (4) organization, and (5) characterization by a value or value complex.

The classes of the affective domain, like those of the cognitive domain, are theoretically hierarchical in nature. However, rather than progressing from simple to complex, the affective objectives are arranged according to the degree of internalization. Accordingly, the objective of receiving requires the least amount of internalization and the objective of characterization represents the internalization to the greatest degree.

The term "internalization" was not concisely defined by the authors of the taxonomy. Instead, it was described with a variety of definitions and examples. Internalization was

compared to the concept of intelligence, which although a useful concept, cannot be defined uni-dimensionally. "It is hoped that internalization will prove a similarly useful basis for this structure, even though it is probably multidimensional" (Krathwohl, Bloom, and Masia, 1966: 31).

Perhaps the best way to understand the continuum of internalization is to look at its use in the progression of classes in the affective domain. The first level of the affective domain is receiving or attending. At this level, the student needs only to acknowledge the existence of a stimuli. The taxonomy further categorizes objectives into (1) awareness, (2) willingness to receive, and (3) controlled or selected attention. The student indicates the internalization of awareness of a subject by acknowledging the existence of an idea or phenomena.

Being aware of the existence of a stimuli is a necessary prerequisite for the second level of the affective domain, responding. Teachers have evidence of this level being reached when the student interacts with a subject or participates in an activity. The student will seek to pay attention to the stimuli. The responding level is comprised of three sub-categories: (1) acquiescence in responding, (2) willingness to respond, and (3) satisfaction in response.

Valuing, the third affective educational objective, is "the only category headed by a term which is in common use in the expression of objectives by teachers" (Krathwohl, Bloom, and Masia, 1966: 180). It describes the assignment of worth to an object. Behavior at this level can be characterized by the student's expression of a belief or an attitude about a subject. The three sub-categories which make up the valuing level of internalization are: (1) acceptance of a value, (2) preference for a value, and (3) commitment. Loyalty to a position or group would fall under the valuing objective.

As a student progressively internalizes values, there comes a time when one value conflicts with another. At this point, organization, the fourth affective objective, is attained. Organization is defined by the taxonomy as the prioritization of values and determination of the inter-relationships among them. The subdivisions of this objective are (1) conceptualization of a value, and (2) organization of a value system.

Finally, the highest level of internalization is found in the characterization by a value or value complex. This final level of the affective domain is reached when the individual's value system has been organized into an internally consistent system and the individual's actions are consistently in accordance with his or her value system. At this level, individuals can be characterized by their

world view or philosophy of life (Krathwohl, Bloom, and Masia, 1966: 165). The two aspects of this level constitute the sub-categories (1) generalized set and (2) characterization. Examples of individuals who have reached this level are Socrates, Christ, and Ghandi. Each of these men lived all aspects of his life by the philosophy each developed.

Because the affective objectives are internal, it is difficult to measure whether or not the objectives have been met. However, lack of accurate measurement tools does not preclude the usefulness of categorizing affective objectives. Categorization will allow teachers to establish goals such as inspiring students to continue learning on their own time. Although such a goal may not be measured, it can be influenced by the amount of enthusiasm brought into the classroom by the instructor (Wilson, 1973).

The Psychomotor Domain

Objectives which emphasize some muscular or motor skill would be included in this domain. As mentioned in the introduction, although recognized by the taxonomy, this domain has not been developed. The few objectives found by researchers in this area related to handwriting, speech, physical education, or trade courses (Krathwohl, Bloom and Masia, 1964: 7).

Applications of Bloom's Taxonomy

When Bloom and his associates developed the taxonomy of educational objectives, their primary goal was to facilitate communication and improve the exchange of ideas between education examiners. They "felt that such a framework could be used to facilitate communication among examiners" (Bloom and others, 1956: 4). Until the taxonomy was developed, there was no common vocabulary in the education field. Terms such as thinking, problem solving, creating, and understanding had different meanings for different people. Since the publication of the taxonomy, practitioners and researchers have been able to speak a common language (Krathwohl, Bloom, and Masia, 1964: 7).

In addition to accomplishing their original goal of developing a classification device, the authors of the taxonomy also provided a system for developing educational curriculum. By presenting a list of specific hierarchical objectives, teachers are able to develop their curricula in a manner that allows one level to build upon the prior one. The validity of the taxonomy in the primary grades has been supported by several studies (Wilson, 1973; Lyon and Gettsinger, 1985). Research involving undergraduate students provided even greater support for using the model to develop curriculum (Kropp, Stoker, and Bashaw, 1966).

Another application of the taxonomy is that it allows for the development of test questions using the taxonomy as a framework (Lipscomb, 1985), (Benson, 1992). Similarly, another researcher promoted the use of the cognitive and affective domains to teach and test business ethics (Francis, 1990).

The taxonomy has also been used widely as a basis for educational programs in the military. Squadron Officer School, the Air Force's initial professional military education course for officers, "uses Bloom's taxonomy of educational objectives as the foundation for structuring its education program" (Berghorn and Lewis, 1992: 1-6).

The Management Department at the United States Air Force Academy uses Bloom's taxonomy, along with other learning theories, as the foundation for developing its learning program.

> [B]ut our approach based on Bloom's taxonomy (1980), Perry's empirical scheme (1968), and contemporary learning theory (Novak 1977) is the *sine qua non* of higher education is 'learning to learn' (Bateson 1973; Senge 1990): creating structure and meaning, making connections, and evaluating knowledge.
> (McKinney and others, 1993: 3)

Knowing that Bloom's taxonomy was part of the foundation for the development of the experimental program led the researcher to investigate literature in which the taxonomy was used as a tool for the comparison of the educational effectiveness between alternate teaching methods (Carlson, 1970), (Oen, 1971). Part of the methodology used

by Carlson (1970) and Oen (1971) involved surveys which required students to evaluate their own abilities or attitudes. Although neither researcher discussed theories of self-appraisal, some of the concepts they were dealing with are now known in the psychology community as self-efficacy.

Overview of Self-Efficacy.

Self-efficacy is a theory which describes a person's perceived ability to accomplish a task. Developed by Albert Bandura (1977, 1982), over the past twenty years, it is still a relatively new construct. One article called the theory "a recent addition to the organizational research agenda" (Gist and Mitchell, 1988: 183). It is a form of self-appraisal which is "hypothesized to affect choice of activities, effort expenditure, and perseverance in the face of difficulties" (Schunk, 1983: 848). Schunk defined self-efficacy as referring to an individual's personal "judgments of how well one can organize and implement actions in specific situations" (1983: 848). Gist and Mitchell define self-efficacy as "a person's estimate of his or her capacity to orchestrate performance on a specific task (1988: 183). Finally, Owen and Froman stated, "In simplest terms, self-efficacy refers to a person's belief that he can succeed at some particular behavior" (1989: 229).

Self-Appraisals

Most self-appraisal research has focused on the accuracy of self-appraisals by individuals evaluating themselves (Fox and Dinur, 1988; Thornton, 1980; Farh, Werbel, and Bedeian, 1988). Research has been conducted in both an experimental and real world settings. Farh, Werbel and Bedeian, conducted an experiment investigating the effectiveness of a self-appraisal based performance evaluation system at a state university (1988). They found that "self ratings were highly congruent with supervisor ratings" and that both ratings "were significantly correlated with appropriate criterion measures" (1988: 153, 154).

Fox and Dinur researched the validity of self assessment over two years, in a real world setting (1988). Their study included 357 males, aged 18-19, being screened for a prestigious military course. They found that self-rating validities were significant for predicting success over a two-year training period (1988: 590). They also found that self-ratings were significantly correlated with both supervisor and peer ratings (1988: 590).

Shortcomings of Self-Efficacy

The biggest drawback of using self-efficacy or self-appraisals as a measure of program effectiveness is the number of variables which can cause a change in an individual's feelings about himself. For example, Schunk showed that people may believe they are more capable of accomplishing a task, having an increase in self-efficacy, simply by being provided positive feedback as to their ability. The test subjects were not actually able to do more, but by being told they were improving, they displayed an increase in self-efficacy.

Although increases in ability and education have been shown to increase self-efficacy, so have verbal persuasion and knowledge that a personal assessment will be used in promotion decisions (Gist and Mitchell, 1992).

Benefits of Self-Appraisals

In agreement with research reviewed above, Gist and Mitchell found that "the predictive validity of self-efficacy is well established" (1992: 187). The Gist and Mitchell conclusion supports the assumption necessary if self-efficacy is to be used for determining educational effectiveness that individuals can be believed when reporting their own ability. As noted earlier, self-

efficacy can be effected by a variety of methods. Education, the effectiveness of which this research is attempting to measure, has been shown to increase self-efficacy. Research has shown that "self-efficacy also changes as a result of learning, experience, and feedback" (Gist and Mitchell, 1992:186).

Having reviewed the literature on self-appraisal, the researcher believes it is reasonable to assume that a self-appraisal questionnaire administered to students who were subject to different teaching methods, would yield valid results as to their amount of learning. Some studies have shown a tendency of individuals to increase their self-evaluations if they thought their evaluations were going to affect them, for example when used for promotion decisions. However, when people see no benefit in inflated results, self-appraisals have been shown to be accurate.

The Fox and Dinur (1988) study is important for this research effort because it was conducted in a setting similar to that of the Air Force Academy. The participants in the study were all male, members of the military and "well above average in physical health, mental health, and intellectual ability" (1988: 583). The cadet wing is 88% male, all members of the military, and also of above average caliber. The similarities of the group studied by Fox and Dinur and Air Force Academy cadets, support the validity of using self-assessments to measure Academy cadets.

Application of Self-Evaluations

The theory of self-efficacy appears to be a useful construct for measuring learning, with learning defined as a change in ability to perform a task. The theory states that as ability increases, all things remaining equal, self-efficacy will increase (Gist and Mitchell, 1992; Schunk, 1993; Farh and others, 1988). Research on the Air Force's Squadron Officer School used the concept of self-efficacy to measure the degree of learning imparted by the program (Jennings, 1991; Berghorn and Lewis, 1992).

One possible way of measuring the difference in educational effectiveness of alternate teaching methodologies could be to measure the difference in self-efficacy of the students who were enrolled in the different course types. The students could be measured with respect to the objectives the Management Department has defined as the department's goals for the senior level courses. These goals were basically the same as the objectives for the relational course as outlined in the paper submitted to the 1993 Instructional Innovation Awards Competition (McKinney Interview, 1994).

Assuming the students in both the relational and traditional courses started with an equal mean self-efficacy in the objective areas measured, a difference in self-efficacy between students after completing the two

treatments should indicate an increase in ability. In other words, if students who took the relational course finished with a significantly higher mean self-efficacy score in the objective of "ability to integrate material," one possible conclusion might be that the relational course is more effective at teaching students how to integrate material.

Conclusion

Forty years ago a committee of college and university educators, chaired by Dr. Benjamin S. Bloom, developed a taxonomy of educational objectives for use in categorizing the desired outcome of education programs. Commonly known as Bloom's Taxonomy, the classification system divided learning into three major domains: (1) cognitive, (2) affective, and (3) psychomotor. This chapter has reviewed each of these domains and provided examples of research which support the validity of the taxonomy. Additionally, works were cited in which education professionals have expanded the taxonomy, including its use as a measurement tool to evaluate educational effectiveness.

Recently, the addition of the theory of self-efficacy has allowed researchers a construct to link knowledge and performance. Self-efficacy can be summarized as an individual's belief in his or her ability to accomplish a certain task. This chapter reviewed literature which

supported the validity of both self-efficacy as a construct and a tool which could be used to evaluate the effectiveness of education programs.

III. METHODOLOGY

Overview

Chapter III describes the experiment design and the development of the instrument used to compare the educational effectiveness of the two teaching methods used by the Management Department of the United States Air Force Academy. In addition to the presentation of the measurement instrument, a discussion of how the data was analyzed is also included. A *t*-test was chosen as the method to determine if there was a significant difference between the two programs.

Experiment Design

This study was designed to evaluate two methods of teaching senior level management courses by the Department of Management at the United States Air Force Academy. To conduct this evaluation, the researcher used data collected from a questionnaire developed for this purpose.

The population studied in this experiment was the seventy-four cadets who were management majors in the Air Force Academy's Class of 1994. The population was divided into two groups, cadets who were enrolled in the relational course, and cadets who had not taken the relational course.

Forty-four of the management majors were enrolled in the relational course, while the remaining thirty were enrolled in only single topic courses taught in the traditional manner. A forty-item survey was distributed to the cadets and completion was voluntary.

Instrument Development

The instrument was developed by the researcher was based on the objectives described in a paper submitted to the 1993 Instructional Innovation Award Competition (McKinney and others, 1993). A forty question self-evaluative questionnaire was developed to compare the self-efficacy of the students taught by the two different teaching methods. The questionnaire was distributed to all the management majors in the Class of 1994 and responses were anonymous and voluntary.

One of the greatest difficulties in determining which teaching methodology is most effective is in defining the term *effective*. As discussed in Chapter I, the term effective is defined in this study to mean the degree to which the student's behavior meets the desired outcomes of the management department. Chapter II, the literature review, reviewed Bloom's Taxonomy, the basis for the development of the relational course as well as provided

evidence that supported the validity of self-appraisals. The development of a self-appraisal questionnaire to determine the effectiveness of the two teaching methods came about as a result of combining the ideas from the previous two chapters.

An interview with the Management Department's curriculum director indicated that the objectives of the senior level management courses could be summarized as the objectives found in the 1993 Instructional Innovation Award paper (McKinney Interview, 1994). The reason for instituting the relational course was to better meet those objectives. It follows that if the relational course is to be considered effective, it must meet those objectives to a greater degree than the functional courses do.

The objectives of the relational course, which are also the objectives of senior level management courses, are taken directly from the 1993 Instructional Innovation Award paper and summarized in the Figure 1.0 (McKinney and others, 1993: 2,3).

Objective 1: Create a complex milieu of information across a broad spectrum of topics where students have to integrate, synthesize, and evaluate information from these topics.
Objective 2: Encourage students to take responsibility for their learning.
Objective 3: Use assignment and assessment methods that encourage students to learn teamwork and to learn from each other within their groups.

Figure 1.0: Management Department Objectives

From the objectives in Figure 1.0, the researcher, determined ten areas which could be tested by self-evaluation questionnaires for the degree to which students had confidence in how well they met those objectives after completing either the relational or functional courses.

Within the first department goal, there were three separate objectives for the students. The Management Department hoped that the relational course would teach students to better 1) integrate, 2) synthesize, and 3) evaluate information.

To understand the survey questions developed to test the first three objectives defined by the researcher, definitions of the some the terms are necessary.

1) *Integrate*--To make whole by bringing parts together, unify (American Heritage Dictionary, 1985: 667).

2) *Synthesize*--Combining elements in such a way as to constitute a pattern or structure not clearly there before (Bloom and others, 1956: 206).

3) *Evaluate*--Quantitative and qualitative judgments about the extent to which material and methods satisfy criteria (Bloom and others, 1956: 207).

The second objective of both the relational course and the Management Department as a whole was to encourage students to take responsibility for their own learning. For purposes of evaluation, this objective was divided into three separate behaviors that could be measured by self-evaluation questionnaires. Within the objective of taking responsibility for their own learning, it was anticipated that students would 1) initiate their own learning, 2) establish their own criteria, and 3) seek attainment of self-set goals (McKinney and others, 1993: 2).

The third and final goal presented as an objective of the Department's senior level courses was to use assignment and assessment techniques to encourage students to learn teamwork from each other within their groups. There are four distinct components of this final objective: 1) Learn

teamwork through assignments, 2) Learn teamwork through assessments, 3) Learn from classmates through assignments, and 4) Learn from classmates through assessments. The distinction between assignments and assessments is a minor one. An assignment was a task such as a reading assignment, which a cadet was asked to accomplish and the task was not graded. Assessments were defined as tests or presentations for which cadets received a grade.

Management Department Objective	Scale
1) Create a complex milieu of information across a broad spectrum of topics where students have to integrate, synthesize, and evaluate information from these topics.	1) Integrate
	2) Synthesize
	3) Evaluate
2) Encourage students to take responsibility for their learning.	4) Initiate
	5) Establish Criteria
	6) Seek Attainment of Self-Set Goals
3) Use assignment and assessment methods that encourage students to learn teamwork and to learn from each other within their groups.	7) Learn Teamwork Through Assignments
	8) Learn Teamwork Through Assessments
	9) Learn from Classmates Through Assignments
	10) Learn from Classmates Through Assessments

Figure 2.0: Management Department Objectives Sub-Divided Into Ten Scales

After dividing the three objectives into the sub-components that would be tested with self-evaluation questionnaires (Figure 2.0), five questions were developed for each of the ten parameters. These ten areas served as

the variables used to determine if there was a significant difference between the students who completed the relational course and those who were enrolled in only traditional classes. The fifty questions were then narrowed to forty questions, retaining three positively worded statements and one self-efficacy statement for each parameter. The final list of statements, organized into the objectives they were designed to test, can be found in Appendix 2.

After a finalized list of forty statements was developed, the statements were organized in a random order for the final instrument. The only limiting heuristic used was that no two subject areas, designated by the letter assigned, could be placed in the final list with less than three different subject area statements between them. The randomized list can be seen in Appendix 3.

To measure the strength of the cadet's agreement or disagreement with the statements seen in Appendix 3, a seven point Likert scale was used (Figure 3).

Decidedly Agree	Moderately Agree	Slightly Agree	Neutral	Slightly Disagree	Moderately Disagree	Decidedly Disagree
1	2	3	4	5	6	7

Figure 3: Seven Point Likert Scale

For this research effort, an interval scale was needed. Emory and Cooper stated "The Likert scale is treated as an interval scale" (1991: 222). The Likert scale consists of favorable or unfavorable statements about a student's

attitudes toward the object of interest. Each response is given a numerical score to reflect the degree to which students agree or disagree with the statement.

> The interval scale has the powers of nominal and ordinal scales plus one additional strength: It incorporates the concept of equality of interval (the distance between 1 and 2 equals the distance between 2 and 3). (Emory and Cooper, 1991: 176)

The words *decidedly*, *moderately*, and *slightly*, were chosen because research has shown them to have ordinal values that were equidistant from one another.

The use of an interval scale was necessary to conduct the analysis of the data gathered. According to Emory and Cooper, "When a scale is interval, you can use the arithmetic mean as the measure of central tendency . . . the use of parametric *t*-tests and *F*-tests are the statistical procedures of choice" (1991: 222, 176).

Instrument Reliability

Before the researcher could use the results of the survey for comparison between samples, the reliability of the instrument first needed to be tested. By reliability, the researcher is referring to the internal consistency or homogeneity of the items. In other words, one needs to know how well each of the four items per objective supplied consistent results. For example: if a student answered "strongly agree" to one of the questions designed to measure his self-efficacy about his ability to integrate material,

and later answered "decidedly disagree" to one of the other three questions designed to measure that same objective, the survey would not have internal consistency.

Fink and Kosecoff state that "you should be especially concerned with internal consistency if the instrument is divided into several parts, each of which is supposed to measure a separate concept or skill" (1980: Sec 6, 3). As previously explained, the instrument used in this study was divided into ten objectives with four questions intended to measure each objective. To determine the internal validity of the instrument, Cronbach's alpha analysis was performed for each set off four questions. Emory and Cooper state "Cronbach's alpha has the most utility for multi-item scales at the interval level of measurement" (1991: 187).

The Cronbach's alpha statistic allows the researcher to measure the degree to which questions specified correlate with each other. The alpha statistic is a measure of the "Degree to which instrument items are homogenous and reflect the same underlying construct" (Emory and Cooper, 1991: 188). In other words, the higher the alpha value, the higher the correlation between the items specified. For purposes of this study, an objective with an alpha value of .80 and higher was considered adequate for further analysis.

Analysis Technique

The self-evaluative questionnaire which was given to the students produced results of values for each question which ranged from 1 to 7. Because the data was of an interval nature, the values from the four questions per objective were added and divided by four to produce a mean value. The mean values of the students in the relational course were compared to the mean values of the students who completed the traditional courses to determine if there was a significant difference between the two groups. The statistical test that was used to test for significance between the two scores was the *t*-test.

> After calculating the mean scores for the two groups and finding them to be different, we are faced with the question of whether this difference is statistically-significant -- is it a true difference or is it due to chance fluctuations in sampling? To determine whether the difference between the two means is significant, compute a critical ratio or *t*-test. (Borg, 1963: 134)

A series of hypotheses was developed to test the difference in educational effectiveness of the alternate teaching methods in each of the ten subject areas derived from the three objectives of the relational course (Figure 4). The hypotheses were set up to allow for a two-tailed *t*-test, because the direction of the difference between samples is of importance to the research. A description of the process of conducting a hypothesis test is outlined in Appendix 7.

Because the purpose of this research is to compare relational and traditional classes, the direction of a significant difference is important. If the mean scores of those students who were enrolled in the relational course were significantly higher or lower, it would indicate the relational teaching method is either more or less effective.

Instrument Administration

Because of time constraints placed on the research, the self-evaluative questionnaire was given to all of the management majors in the Class of 1994 as a post-test. In administering the survey as a post test, two important assumptions had to be made. First, it was assumed that all management majors had the same level of self-efficacy before they began either the relational course or the single topic courses. The second assumption was that any change in self-efficacy would be positive.

The research methodology compared the level of self-efficacy between the students enrolled in the two course types after completion of the courses. Both assumption were necessary to compare the courses, because it can not be determined from a post test the change in the level of self-efficacy. Consequently, the different teaching methods could have had either no effect or a negative effect on self-efficacy. The results of the questionnaire would be

useless to this research effort without the two assumptions mentioned above.

The questionnaire included a cover letter and a scantron form. The cover letter can be seen in Appendix 4. The forms were completed outside of class and cadets were given three days to complete the survey. To promote honest responses, the survey was voluntary and anonymous. Research has shown that subjects are more objective and accurate in self-evaluations when individuals believe the results of the surveys will not affect them personally (Gist and Mitchell, 1992).

Conclusion

The discussion in Chapter III centered on the methodology employed to complete this research effort. First the design of the experiment was discussed, followed by development of the instrument. In addition to the presentation of the measurement instrument, a discussion of how the data was analyzed was also included. The statistical techniques of Cronbach's alpha and *t*-test were reviewed. Finally, the hypotheses which the *t*-tests were conducted on were presented at the end of the chapter.

HYPOTHESES
1. There is no significant difference in the cadets' self-evaluation of their ability to integrate material between students in the relational and students in the traditional classes.
2. There is no significant difference in the cadets' self-evaluation of their ability to synthesize material between students in the relational and students in the traditional classes.
3. There is no significant difference in the cadets' self-evaluation of their ability to evaluate material between students in the relational and students in the traditional classes.
4. There is no significant difference in the cadets' self-evaluation of their ability to initiate learning between students in the relational and students in the traditional classes.
5. There is no significant difference in the cadets' self-evaluation of their ability to establish criteria between students in the relational and students in the traditional classes.
6. There is no significant difference in the cadets' self-evaluation of their ability to seek attainment of self set goals between students in the relational and students in the traditional classes.
7. There is no significant difference in the cadets' self-evaluation of their ability to learn through teamwork as a result of assignments between students in the relational and students in the traditional classes.
8. There is no significant difference in the cadets' self-evaluation of their ability to learn through teamwork as a result of assessments between students in the relational and students in the traditional classes.
9. There is no significant difference in the cadets' self-evaluation of their ability to learn from peers as a result of assignments between students in the relational and students in the traditional classes.
10. There is no significant difference in the cadets' self-evaluation of their ability to learn from peers as a result of assessments between students in the relational and students in the traditional classes.

Figure 4: Hypotheses for Testing Scales

IV. FINDINGS AND ANALYSIS

Introduction

This chapter discusses the data obtained from the instrument which was administered to the senior management majors in the United States Air Force Academy's Class of 1994. The data was analyzed using the methods described in Chapter III. The chapter starts with a review of the experiment followed by a discussion of the results of the questionnaires returned. Third, Cronbach's alpha statistics are outlined to demonstrate the reliability of the four items used to measure each of the ten variables. Next, there is an analysis of the results of the hypothesis test, using the *t*-test statistics to determine if there is a significant difference between student groups.

Experiment Review

The findings and analysis of this chapter are based on the results of a questionnaire distributed to seventy-four cadets who were management majors in the Air Force Academy Class of 1994. The questionnaire was administered in an attempt to compare the educational effectiveness of two teaching methodologies used to teach a semester of senior level management courses. The two pedagogies are relational

instruction and traditional instruction. Relational instruction combines management information systems, strategy, and marketing into one inter-disciplinary class using a variety of methods to deliver material. Each class runs for three hours. Students in the traditional courses receive instruction from one instructor per course and attend the three fifty minute classes at different times in separate classrooms.

The effectiveness of the instruction was based on the results from a forty item self-evaluating questionnaire the students filled out after completing their courses. The questionnaire was designed to test the mean differences in each of the ten objectives between the relational and traditional groups. The ten objectives tested were determined by the researcher to be the goals of the Management Department senior level courses. Four questions were used to test each objective. The mean scores of the students were used for comparison between those enrolled in the relational course and those who completed the three traditional courses.

Response Rate

The questionnaire, described in Chapter III, was distributed to all seventy-four senior management majors in the Academy's Class of 1994. To increase the candor of the respondents, the survey was voluntary and anonymous. The survey can be seen in Appendix 3. Sixty individuals completed and returned the surveys. All sixty surveys were filled out correctly and were used for data analysis. Sixty questionnaires returned represents an eighty-one percent return rate. Table 1 below illustrates the response rate by student groups. Of the sixty students who returned surveys, twenty-two returned the cover letter with their address on it so that a copy of the results could be sent to them. The cover letter is in Appendix 4.

Table 1.0: Survey Response Rates

Group	Total Students	Surveys Returned	Response Rate (%)
All Senior Management Majors **(Both Groups)**	74	60	**%81.1**
Students Enrolled in the **Relational Course**	44	38	**%86.4**
Students Enrolled in **Single Topic Courses**	30	22	**%73.3**

Internal Validity

As discussed in Chapter III, the internal reliability of the survey instrument was determined using Cronbach's alpha analysis. The analysis was performed on each set of four questions which was developed to evaluate ten scales derived from the Management Department's three objectives for senior level classes (See Figure 1.0). The higher the alpha statistic, the greater the confidence that the group of questions are measuring the same underlying construct (Emory and Cooper, 1991: 188). For purposes of this study, an objective with an alpha value of .80 and higher was considered adequate for further analysis.

Table 2 shows the Cronbach's alpha values for the ten scales. All ten of the scales developed by the researcher proved to have a Cronbach's alpha statistic greater than .80. Once the internal reliability of the instrument was validated, *t*-tests of the hypothesis outlined in Chapter III could be conducted.

Table 2.0: Cronbach's Alpha Coefficients

Management Department Objective	Scale	Alpha Value
1) Create a complex milieu of information across a broad spectrum of topics where students have to integrate, synthesize, and evaluate information from these topics.	1) Integrate	.92
	2) Synthesize	.90
	3) Evaluate	.87
2) Encourage students to take responsibility for their learning.	4) Initiate	.83
	5) Establish Criteria	.90
	6) Seek Attainment of Self-Set Goals	.84
3) Use assignment and assessment methods that encourage students to learn teamwork and to learn from each other within their groups.	7) Learn Teamwork Through Assignments	.94
	8) Learn Teamwork Through Assessments	.85
	9) Learn from Classmates Through Assignments	.84
	10) Learn from Classmates Through Assessments	.86

Hypothesis Tests

There were four questions for each scale of the self-evaluation questionnaire. The total number of respondents was divided into two groups, those students enrolled in the relational course and those enrolled in the traditional course. The responses for each set of four questions were summed and divided by the total number of responses to produce a mean score for that scale. The mean scores of each scale of four questions were compared between the relational and traditional groups. Two-tailed *t*-tests were conducted to determine if there was a significant difference

between the two groups. A higher *t*-test statistic results in a lower level of significance. The researcher considered a significance level below .10 to be an indication of a statistically-significant difference between the means. A hypothesis that was rejected with a significance level of .10 would allow the researcher to conclude with 90% confidence that there was a statistically-significant difference between the mean values of the two groups.

Hypothesis 1: There is no significant difference in the cadets' self-evaluation of their ability to integrate material between students in the relational and students in the traditional classes.

Table 3.1: Mean and *t*-test Results for Integrate Scale

Scale: **INTEGRATE**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	1.84	.3858	.7071
Traditional	22	1.74		

As can be seen in Table 3.1, hypothesis 1 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to their ability to integrate material.

Hypothesis 2: There is no significant difference in the cadets' self-evaluation of their ability to synthesize material between students in the relational and students in the traditional classes.

Table 3.2: Mean and *t*-test Results for Synthesize Scale

Scale: **SYNTHESIZE**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	1.86	-.3822	.7037
Traditional	22	1.95		

As can be seen in Table 3.2 above, hypothesis 2 is accepted at the .10 significance level. The *t*-test statistic indicates that there is not a statistically-significant difference between the students who were taught with the relational method and the students taught with the traditional method, with respect to their ability to synthesize material.

Hypothesis 3: There is no significant difference in the cadets' self-evaluation of their ability to evaluate material between students in the relational and students in the traditional classes.

Table 3.3: Mean and *t*-test Results for Evaluate Scale

Scale: **EVALUATE**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.01	.4137	.6806
Traditional	22	1.91		

As can be seen in Table 3.3 above, hypothesis 3 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to their ability to evaluate material.

Hypothesis 4: There is no significant difference in the cadets' self-evaluation of their ability to initiate learning between students in the relational and students in the traditional classes.

Table 3.4: Mean and *t*-test Results for Initiate Scale

Scale: **INITIATE**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	1.94	.8504	.3986
Traditional	22	1.75		

As can be seen in Table 3.4 above, hypothesis 4 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to their ability to initiate their own learning.

Hypothesis 5: There is no significant difference in the cadets' self-evaluation of their ability to establish criteria between students in the relational and students in the traditional classes.

Table 3.5: Mean and *t*-test Results for Establish Criteria Scale

Scale: **ESTABLISH CRITERIA**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.20	-.1639	.8703
Traditional	22	2.24		

As can be seen in Table 3.5, hypothesis 5 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to establishing criteria.

Hypothesis 6: There is no significant difference in the cadets' self-evaluation of their ability to seek attainment of self set goals between students in the relational and students in the traditional classes.

Table 3.6: Mean and *t*-test Results for Seek Attainment of Self-Set Goals Scale

Scale: **SEEK ATTAINMENT OF SELF-SET GOALS**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.16	.9926	.3250
Traditional	22	1.90		

As can be seen in Table 3.6 above, hypothesis 6 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to their ability to seek attainment of self-set goals.

Hypothesis 7: There is no significant difference in the cadets' self-evaluation of their ability to learn through teamwork as a result of assignments between students in the relational and students in the traditional classes.

Table 3.7: Mean and *t*-test Results for Learn Teamwork Through Assignments Scale

Scale: **LEARN TEAMWORK THROUGH ASSIGNMENTS**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.43	.5531	.5823
Traditional	22	2.22		

As can be seen in Table 3.7 above, hypothesis 7 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to how well they learned teamwork through assignments in the course or courses in which they were enrolled.

Hypothesis 8: There is no significant difference in the cadets' self-evaluation of their ability to learn through teamwork as a result of assessments between students in the relational and students in the traditional classes.

Table 3.8: Mean and *t*-test Results for Learn Teamwork Through Assessments Scale

Scale: **LEARN TEAMWORK THROUGH ASSESSMENTS**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.81	.8755	.3849
Traditional	22	2.50		

As can be seen in Table 3.8 above, hypothesis 8 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to how well they learned teamwork through assessments in the course or courses in which they were enrolled.

Hypothesis 9: There is no significant difference in the cadets' self-evaluation of their ability to learn from peers as a result of assignments between students in the relational and students in the traditional classes.

Table 3.9: Mean and *t*-test Results for Learn From Peers Through Assessments Scale

Scale: **LEARN FROM PEERS THROUGH ASSESSMENTS**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.40	.4094	.6837
Traditional	22	2.30		

As can be seen in Table 3.9 above, hypothesis 9 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to how well they learned from peers through assessments in the course or courses in which they were enrolled.

Hypothesis 10: There is no significant difference in the cadets' self-evaluation of their ability to learn from peers as a result of assessments between students in the relational and students in the traditional classes.

Table 3.10: Mean and *t*-test Results for Learn From Peers Through Assignments Scale

Scale: **LEARN FROM PEERS THROUGH ASSIGNMENTS**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.42	-.1511	.8804
Traditional	22	2.47		

As can be seen in Table 3.10 above, hypothesis 10 is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to how well they learned from peers through assignments in the course or courses in which they were enrolled.

Finally, to summarize the results of the ten hypothesis tests, no scales showed a statistically-significant difference between the students who were enrolled in the relational course and those enrolled in the traditional courses.

Grouped Hypothesis Tests

After completing the ten hypothesis tests on the scales developed by the researcher and finding no significant difference between groups in any of the tests, the researcher combined the ten scales into the Management Department's three objectives from which the scales were originally derived. The three objectives can be seen in Table 2. Another set of hypotheses was developed to test the three objectives (Figure 5).

HYPOTHESES FOR TEST OF SCALES GROUPED INTO ORIGINAL MANAGEMENT DEPARTMENT OBJECTIVES
1. There is no significant difference in the cadets' self-evaluation of their ability to integrate, synthesize, and evaluate material between students in the relational and students in the traditional classes.
2. There is no significant difference in the cadets' self-evaluation of their ability to take responsibility for their own learning between students in the relational and students in the traditional classes.
3. There is no significant difference in the cadets' self-evaluation of their increased ability to work in teams and learn from classmates as a result of assignments and assessments between students in the relational and students in the traditional classes.

Figure 5: Grouped Hypothesis Tests

Three scales were derived from the first two objectives and four scales were derived from the third objective. Each scale consisted of four questions on the self-evaluation questionnaire. The mean scores used for the *t*-test of each objective were calculated by adding up either twelve or sixteen questions designed to measure the components of that

objective and dividing by the total number of questions. These mean scores for each student were then compared between the relational and traditional groups.

Two-tailed *t*-tests were conducted to determine if there was a significant difference between the two groups. SAS computer software was used to calculate the new mean values for each objective as well as the *t*-test statistic. As in the previous section, the researcher considered a significance level below .10 to be an indication of a statistically-significant difference between the means.

Hypothesis 1A: There is no significant difference in the cadets' self-evaluation of their ability to integrate, synthesize, and evaluate material between students in the relational and students in the traditional classes.

Table 4.1: Mean and *t*-test Results for Integrate, Synthesize, and Evaluate Material

Objective 1: **INTEGRATE, SYNTHESIZE, AND EVALUATE MATERIAL**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	1.90	.1473	.8835
Traditional	22	1.87		

As can be seen in Table 4.1, hypothesis 1A is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to their ability to perform the cognitive objectives.

Hypothesis 2A: There is no significant difference in the cadets' self-evaluation of their ability to take responsibility for their own learning between students in the relational and students in the traditional classes.

Table 4.2: Mean and *t*-test Results for Initiate, Establish Criteria, and Seek Attainment of Self-Set Goals

Objective 2: **INITIATE, ESTABLISH CRITERIA, AND SEEK ATTAINMENT OF SELF-SET GOALS**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.10	.5971	.5629
Traditional	22	1.96		

As can be seen in Table 4.2 above, hypothesis 2A is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students

taught with the traditional method with respect to how well they accomplished the affective objectives.

Hypothesis 3A: There is no significant difference in the cadets' self-evaluation of their increased ability to work in teams and learn from classmates as a result of assignments and assessments between students in the relational and students in the traditional classes.

Table 4.3: Mean and *t*-test Results for Learn Teamwork and From Classmates as a Result of Assignments and Assessments

Objective 3: **LEARN TEAMWORK AND FROM CLASSMATES AS A RESULT OF ASSIGNMENTS AND ASSESSMENTS**				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.52	.4863	.6282
Traditional	22	2.37		

As can be seen in Table 4.3 above, hypothesis 3A is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to how well they learned teamwork and from classmates as a results of assignments and assessments in the course or courses in which they were enrolled.

Finally, to summarize the results of the three combined scales hypothesis tests, none of the three objectives proved to have a statistically-significant difference between the responses from students who were enrolled in the relational course and the responses of those enrolled in the traditional courses.

Factor Analysis

After conducting hypothesis tests on the ten scales and the three objectives and finding no significant difference between the relational and traditional classes, the researcher decided to conduct a factor analysis. A factor analysis is a procedure that can be accomplished using SAS computer software. "The purpose of common factor analysis is to explain the correlation or covariance among a set of variables in terms of a limited number of unobservable, latent variables" (SAS Institute, Inc., 1991:39).

In other words, a factor analysis attempts to find correlating scales in the data, based on the data itself. For example: if every student answered questions three, five, and seven by marking the number 1 and responded to all other questions by marking 2 and higher, questions three, five, and seven would constitute a scale, whether or not they were designed to measure the same attribute. The data gathered from the survey administered to the participants of

this study were not as obvious as the example, but the SAS software was able to uncover scales which differed from those designed by the researcher.

The factor analysis resulted in three distinct scales. The scales can be seen in Figure 5. The first scale was comprised of the questions which were derived from the first two objectives. The second scale was comprised of the two variables which were designed to measure a student's increased knowledge of teamwork. The final scale was comprised of the two variables which were designed to gauge how students learned from classmates.

These three scales illustrate the fact that students tended to answer the questions which addressed the component of each scale in a similar manner. The questions which were designed to measure a student's ability to integrate, synthesize, evaluate, initiate, establish goals, and seek attainment of self-set goals all resulted in similar mean scores. The questions designed to measure how well assignments taught teamwork and how well assessments taught teamwork also proved to have similar mean scores. However, the latter set of scores differed significantly from the mean scores of the previous scale. Finally, the questions designed to measure how well assignments encouraged learning from peers and how well assessments encouraged learning from peers shared similar responses on the survey.

Scale	Components
SCALE 1	Integrate, Synthesize, Evaluate, Initiate, Establish Goals, Seek Attainment of Self-Set Goals
SCALE 2	Learn Teamwork Through Assignments, Learn Teamwork Through Assessments
SCALE 3	Learn From Classmates Through Assignments, Learn From Classmates Through Assessments

Figure 6: Scales Resulting From Factor Analysis

Once the three scales were discovered, another set of hypothesis tests was developed to determine if there was a significant difference between the mean scores of the students who completed the relational course and the students who completed the traditional courses.

HYPOTHESES FOR TEST OF SCALES DERIVED FROM SAS FACTOR ANALYSIS
1. There is no significant difference in the cadets' mean scores on the questions which make up the components of SCALE 1 between students in the relational and students in the traditional classes.
2. There is no significant difference in the cadets' mean scores on the questions which make up the components of SCALE 2 between students in the relational and students in the traditional classes.
3. There is no significant difference in the cadets' mean scores on the questions which make up the components of SCALE 3 between students in the relational and students in the traditional classes.

Figure 7: Hypotheses for Test of Scales Derived From Factor Analysis

The mean scores used for the *t*-test of the first scale were calculated by adding the responses to twenty-eight questions which made up the components of that scale and dividing by the total number of questions. The mean scores

for the second two scales were calculated by adding the responses to the eight questions and dividing by eight. The mean scores for each scale were then compared between the relational and traditional groups.

Two-tailed *t*-tests were conducted to determine if there was a significant difference between the two groups. SAS computer software was used to calculate the new mean values for each objective as well as the *t*-test statistic. As in the previous section, the researcher considered a significance level below .10 to be an indication of a statistically-significant difference between the means.

Hypothesis 1B: There is no significant difference in the cadets' mean scores on the questions which make up the components of SCALE 1 between students in the relational and students in the traditional classes.

Table 5.1: Mean and *t*-test Results for Scale 1

Scale 1: Integrate, Synthesize, Evaluate, Initiate, Establish Goals, Seek Attainment of Self-Set Goals				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.00	.3841	.7023
Traditional	22	1.91		

As can be seen in Table 5.1, hypothesis 1B is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to their abilities measured by the questions which made up the components of scale 1.

Hypothesis 2B: There is no significant difference in the cadets' mean scores on the questions which make up the components of SCALE 2 between students in the relational and students in the traditional classes.

Table 5.2: Mean and *t*-test Results for Scale 2

Scale 2: Learn Teamwork Through Assignments and Assessments				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.61	.7229	.4726
Traditional	22	2.35		

As can be seen in Table 5.2 above, hypothesis 2B is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to how well they learned teamwork through assignments and assessments.

Hypothesis 3B: There is no significant difference in the cadets' mean scores on the questions which make up the components of SCALE 3 between students in the relational and students in the traditional classes.

Table 5.3: Mean and *t*-test Results for Scale 3

Scale 3: Learn From Classmates Through Assignments And Assessments				
Pedagogy	Number	Mean	*t*-test Statistic	Significance Level
Relational	38	2.41	.1128	.9106
Traditional	22	2.38		

As can be seen in Table 5.3, hypothesis 3B is accepted at the .10 level of significance. The *t*-test statistic indicates that there is not a statistically-significant difference between the mean scores of the students taught with the relational method and the students taught with the traditional method with respect to how well they learned from their classmates through assignments and assessments.

Conclusion

This chapter discussed the data obtained from the instrument which was developed by the researcher and administered to the senior management majors in the United States Air Force Academy's Class of 1994. The data was analyzed using the methods described in Chapter III. The chapter began with a review of the experiment followed by a discussion of the results of the questionnaires returned. Third, an analysis of the validity of the instrument was conducted using Cronbach's alpha to validate the homogeneity of the four items used to measure each of the ten variables.

A series of hypothesis tests was conducted on each of the ten variables. Hypothesis tests were also conducted on the variables grouped into the Management Department objectives from which they were derived. Next, a factor analysis was conducted to derive the significant factors from the data. Three distinct factors were illustrated by SAS software. Hypothesis tests were performed on each of these factors as well. None of the hypothesis tests found a statistically-significant difference between students enrolled in the relational and traditional courses.

V. CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter discusses the results of the researcher's effort to compare the educational effectiveness of alternate methods of teaching three senior level courses by the Management Department of the United States Air Force Academy. The chapter is divided into five sections. First, the author summarizes the purpose and scope of the research. Next, the accomplishment of the research objectives is discussed. The third section presents the author's interpretation of the research findings, followed by a section of recommendations. Finally, suggestions for further research are provided.

Research Summary

The purpose of this research was to answer the question presented in the problem statement: How does the teaching effectiveness of the relational course compare to that of the single topic courses offered by the Management Department at the United States Air Force Academy? The term *teaching effectiveness* was defined as the degree to which students accomplished the Management Department's objectives for senior level management courses.

The relational course, titled *The Management Capstone Course*, combined Management Information Systems (MIS), Marketing, and Strategic Management into one course worth nine credits. The course is taught using a variety of delivery methods, including team teaching, seminars, field trips, and student learning teams. The Management Department has been experimenting with the relational course for the past three years.

The single topic courses are courses covering the three topics of the relational course, taught separately, at different times and in different classrooms. Also known as traditional courses, the single topic courses are representative of the pedagogy used for most other courses at the Academy. The classes are taught by a single instructor using the lecture method. This research effort was designed to assist the Management Department in determining whether to implement the relational course department-wide or discontinue the experiment and resume teaching all seniors using only single topic courses.

Accomplishment of Research Objectives

To answer the question in the problem statement, three research objectives were developed. The objectives were to: 1) determine the Management Department's objectives for senior level courses, 2) select a tool for measuring the

effectiveness of the two different course types in meeting the department's objectives, and 3) evaluate the management majors in the Academy Class of 1994 to determine if there are significant differences, in terms of the department's objectives, between the cadets enrolled in the relational course and those who took the single topic courses separately.

The first research objective, determining the Management Department's objectives for senior level courses, was the easiest objective to accomplish. An interview with the department's curriculum director indicated that the objectives could be found in a paper written about the relational course submitted to the DSI 1993 Instructional Innovation Award Competition. The three objectives can be found in Chapter III, Figure 1.0.

Many of the Management Department's objectives were based on Bloom's taxonomy of educational objectives, which was reviewed in the literature review. Determining and understanding the department's objectives was important to the research because it allowed the researcher to develop a framework to measure educational effectiveness.

After defining educational effectiveness in terms of how well students accomplish the Management Department's three objectives, the second research objective presented itself. A tool had to be selected for measuring the effectiveness of the two different course types in meeting

the department's objectives. The literature review provided support for the theory of self-efficacy and the validity of self-evaluations.

The researcher developed a self-evaluation questionnaire which was administered to all the students enrolled in both course types. The survey was developed by dividing the Management Department's three objectives for senior level courses into ten separate scales. The ten scales can be seen in Chapter III, Figure 2.0. The survey contained four questions addressing each scale, for a total of forty questions.

The survey was administered to the students a week after completing their courses. Responses were limited to a seven point Likert scale. Hypothesis tests were designed to determine whether or not there was a statistically-significant difference between the scores of the students enrolled in the relational course and the scores of the students enrolled in the traditional course.

Developing the hypothesis tests completed the second research objective. Next, the third and final research objective was addressed: evaluate the management majors in the Academy Class of 1994 to determine if there was a statistically-significant difference, in terms of the department's objectives, between the cadets enrolled in the relational course and those who were enrolled in the single topic courses separately.

Chapter IV addressed the third research objective. Of the 74 management majors in the Class of 1994, sixty students returned the survey. The results of the hypothesis tests on the ten scales developed by the researcher found that there was no statistically-significant difference between the students who were enrolled in the relational course and those who were enrolled in the single topic courses separately. All hypothesis tests were conducted using the t-test statistic at the .10 level of significance.

In an effort to further investigate the data, the responses to the ten scales were grouped into the three department objectives from which the scales were derived. Hypothesis tests were again conducted and again no statistically-significant differences were found between the relational and traditional groups.

Finally a factor analysis was conducted to derive the significant factors from the data. Three distinct factors were illustrated by SAS software (SAS Institute). Hypothesis tests were performed for each of these factors as well. Again, none of the hypothesis tests found a statistically-significant difference between the mean scores of students enrolled in the relational course and the scores of students who completed the single topic courses.

Conclusions Based on Findings

The purpose of this research was to answer the question presented in the problem statement: How does the teaching effectiveness of the relational course compare to that of the single topic courses offered by the Management Department at the United States Air Force Academy? The author concludes that based on the results of the data analyzed in this research effort there is no significant difference in the educational effectiveness between the relational course and the single topic courses offered by the Management Department of the United States Air Force Academy.

Before accepting the research conclusion, several important factors must be remembered. First, the definition of educational effectiveness included a limited number of factors in this study. Educational effectiveness was defined as the degree to which students accomplished the three objectives of the Management Department's senior-level courses. Their level of accomplishment was measured by a self-evaluation questionnaire with the assumption that the responses would be honest. Additionally, the survey was built around the construct of self-efficacy, a theory which hypothesizes that a person's ability to accomplish a task can be measured in terms of that person's estimate of his or her capacity to perform that task.

Although students were directed to respond to the survey questions considering only the relational or three traditional courses they had completed, it is possible that their responses were based on a broader range of educational experiences. The research instrument was designed to measure self-efficacy, and the literature review illustrated that self-efficacy can be increased by a variety of factors. It is possible that the students in both classes shared similar efficacy results as a consequence of the numerous other experiences shared as cadets at the Academy, rather than the impact of their teaching methodology.

Another possibility for the lack of significant difference between the educational effectiveness of the two programs is the fact that this was administered as a post test. An assumption was made that students in the relational course and students in the single topic courses started at the same level of self-efficacy. If this assumption was not true, then the results of this research would be interpreted differently. If one group of students started at a lower self-efficacy and both groups finished at the same level, it might be concluded that the method used to teach the students who started with the lower efficacy was more effective. This conclusion could be drawn because one teaching methodology brought about a greater increase in efficacy, implying that it was more effective because it generated more learning.

Finally, one must be careful in applying the results of this research to a civilian school without taking into account the differences between civilian institution goals and those of a military academy. There will undoubtedly be many similarities between courses offered at the Academy and courses offered at civilian business schools. However, because the goals of an organization drive methods used to attain them, one must first examine the goals of the civilian business school in question and compare them to the goals of the Management Department of the Air Force Academy.

Also, the United States Air Force Academy has well above average minimum SAT, ACT, and GPA admission requirements which result in a homogenous group of individuals who are of above average intelligence. This factor should be taken into account by civilian institutions when looking at the results of this research. A relational teaching method may have a different result with students who are more diverse.

Other research has suggested that the effectiveness of different teaching methodologies is dependent on the intellectual ability of the students. Carlson (1970: 62) found that whether a class was taught with discussion or lecture had no significant impact on educational effectiveness for students who scored in the upper one-third on the ACT. However, the method of teaching did have a statistically-significant difference on the educational

effectiveness for students who scored in the lower two-thirds on the ACT, even though they sat in the same classrooms as those who scored in the upper one-third.

Carlson's findings illustrate another possible reason that there was no significant difference between relational and traditional students. The results could be because both groups of students were in the upper one-third of the population academically. By virtue of being accepted to the Academy, they had ACT minimum scores in the upper one-third. Perhaps college students who are above average academically learn material and mental processes more by their own initiative than by the teaching method used to instruct them.

Recommendations

If the conclusion presented at the beginning of the previous section is accepted, the Management Department's decision to mandate or discontinue the relational course should be made easier. This research has showed that there is no significant difference in the educational effectiveness of the relational and traditional teaching methodologies. Therefore, this research effort was successful in removing one of the variables in the Department Head's decision regarding the fate of the relational course.

In terms of the variables measured in this study, the education received by management students will be the same regardless of the teaching method used to deliver the material. This finding allows the decision maker to chose a teaching method based on other factors. Such factors might include instructor preference or scheduling flexibility afforded the students. Another important consideration could be the gratification level of the students. No effort was made by the researcher to discover how much the students enjoyed the course or courses in which they were enrolled. Student feedback is an important input which should be considered by the decision maker.

Another recommendation is that the Management Department carefully establish the goals and concrete decision criteria for their experimental programs before implementing them. A more structured approach to experimental programs would have allowed the Department to evaluate the relational class internally and probably much sooner. The structure should be careful not to limit the possibilities for experimentation, but require that measurable outcomes be established before an experiment is conducted.

An outline to follow might be the process used by the acquisition community to purchase a new weapons system. First, establish the reason for the experiment; what mission requirement is currently not being addressed or could be

improved by a new program? Second, describe the experimental program and tell how the new program intends to be an improvement over the current system. Finally, establish a time line with concrete accept/reject criteria, so that the program does not continue indefinitely without tangible results. This process could prove beneficial to the Management Department, increasing both the effectiveness and efficiency of its experimental programs.

Future Research

On the basis of experience gained through this research effort, the following four recommendations are suggested for future research in the area of comparing teaching methodologies at the undergraduate level.

1) A similar study could be conducted by administering a pre/post test combination, so that the change in self-efficacy could be compared between two methodologies and used to determine educational effectiveness.

2) A similar study could be conducted by redefining educational effectiveness in terms of a national accreditation organization's requirements and developing an instrument using the accreditation criteria as a guide.

3) A similar study could be conducted using a subject-matter test designed to evaluate actual student performance, rather than student self-efficacy.

4) A similar study could be conducted at a civilian institution with a more diverse student population, comparing the effect of different teaching methodologies on various cognitive ranges, using standardized test scores, such as the SAT, to subdivide the sample for analysis.

Conclusion

This chapter reviewed the results of the researcher's effort to compare the educational effectiveness of alternate methods of teaching three senior level courses by the Management Department of the United States Air Force Academy. The chapter summarized the purpose and scope of the research and detailed the accomplishment of the research objectives. The author found no significant difference between the relational and traditional programs in terms of educational effectiveness and gave possible causes for this finding. A series of recommendations was suggested for use by the Management Department. Finally, four suggestions for further research were presented.

Appendix 1:

United States Air Force Academy Educational Outcomes

1) Officers who possess breadth of integrated, fundamental knowledge in the basic sciences, and depth of knowledge in the area of concentration of their choice.

2) Officers who can frame and resolve ill-defined problems.

3) Officers who can communicate effectively.

4) Officers who are independent learners.

5) Officers who can work effectively with others.

6) Officers who are intellectually curious.

7) Officers who can apply their knowledge and skill to the unique tasks of the military profession.

Source: Dean of Faculty, United States Air Force Academy. Memorandum for Distribution to Academic Departments, Educational Outcomes. 1993.

Appendix 2:

Preliminary Self-Evaluating Questionnaire Statements Organized By Objectives

A) Integrate- To make into whole by bringing all parts together; unify
A1. This class has improved my ability to integrate material from different disciplines.
A2. I can bring together information from separate disciplines to support a single assignment.
A3. I am able to unite different concepts to a single idea.
A4. I have confidence in my ability to put together information from different disciplines to solve a problem.

B) Synthesize- Combining elements in such a way as to constitute a pattern or structure not clearly there before.
B1. This class has improved my ability to synthesize material from different disciplines.
B2. I am able to combine different concepts into an original concept of my own.
B3. Given several different aspects of a topic, I can combine them to present a pattern not clearly seen when separate.
B4. I have confidence in my ability to put together several sources from different disciplines to complete an assignment.

C) Evaluate- Quantitative and Qualitative judgments about the extent to which material and methods satisfy criteria.
C1. This class has improved my ability to evaluate material from different disciplines.
C2. I am able to distinguish the value of information based on criteria I'm given.
C3. Given a set of criteria, I can evaluate the extent to which material satisfy it.
C4. I have confidence in my ability to judge the usefulness of information I am presented with.

D) Initiate- To cause to begin
D1. This class has improved my ability to initiate research on my own.
D2. I intend to continue learning on my own time.
D3. I am able to start research without being required to do so.
D4. I have confidence in my ability to initiate my own learning.

E) Establish Criteria- Set forth a standard, rule, or test on which a judgment or decision can be based
E1. This class has improved my ability to establish criteria for things I wish to learn.
E2. I can develop my own learning objectives.
E3. I am able to create standards to serve as guides for my learning.
E4. I have confidence in my ability to establish learning criteria.

F) Seek Attainment of self set goals
F1. This class has improved my initiative to achieve education goals I set for myself.
F2. I intend to continue setting goals on my own time.
F3. I am able to set research goals without being required to do so.
F4. I have confidence in my ability to seek attainment of self set goals.

G) Learning Teamwork Through Assignment
G1. The assignments in this class have helped me improve my ability to work in a team.
G2. Through assignments in this class I have learned to be a better team member.
G3. I am able to work on teams, more effectively, due to the assignments I have had in this class.
G4. Because of the assignments in this class, I have confidence in my ability to work on a team.

H) Learn Teamwork Through Assessment
H1. The assessments in this class have helped me improve my ability to work in a team.
H2. I will begin working on teams more often as a result of the tests or presentations I have done in this class.
H3. I am better able to work on teams due to the tests or presentations in this class.
H4. Because of the methods of assessment in this class, I have more confidence in my ability to work on a team.

I) Learn From Classmates Through Assignments
I1. The assignments in this class have helped me improve my ability to learn from classmates.
I2. I realize how much I can learn from my classmates as a result of assignments we have had in this class.
I3 My classmates have taught me things through assignments I have had in this class.
I4 Because of the assignments in this class, I have confidence in my ability to learn from my classmates.

J) Learn From Classmates Through Assessments
J1. The assessments in this class have helped me improve my ability to learn from classmates.
J2. I will seek to learn from my co-workers more often as a result of the tests, or presentations in this class.
J3. I am able to better learn from my classmates due to the tests, or presentations in this class.
J4. Because of the methods of assessment in this class, I have more confidence in my ability to learn from my classmates.

Appendix 3:

Preliminary Self-Evaluating Questionnaire Statements In Random Order

A) Integrate- To make into whole by bringing all parts together; unify
B) Synthesize- Combining elements in such a way as to constitute a pattern or structure not clearly there before.
C) Evaluate- Quantitative and Qualitative judgments about the extent to which material and methods satisfy criteria.
D) Initiate- To cause to begin
E) Establish Criteria- Set forth a standard, rule, or test on which a judgment or decision can be based
F) Seek Attainment of self set goals-
G) Learning Teamwork Through Assignment
H) Learn Teamwork Through Assessment
I) Learn From Classmates Through Assignments
J) Learn From Classmates Through Assessments

J1. The methods of evaluation used in this class have helped me improve my ability to learn from classmates.
D4. I have confidence in my ability to initiate my own learning.
B3. Given several different aspects of a topic, I can combine them to present a pattern not clearly seen when separate.
E2. I can develop my own learning objectives.
G1. The assignments in this class have helped me improve my ability to work in a team.
A3. I am able to unite different concepts into a single idea.
J4. Because of the methods of assessment in this class, I have more confidence in my ability to learn from my classmates.
H2. I will begin working on teams more often as a result of the tests or presentations I have done in this class.
I3. My classmates have taught me things through assignments I have had in this class.
G4 I have a better understanding of how teams work as a result of assignments in this class.
E3. I am able to create standards to serve as guides for my learning.
H1. The methods of evaluation in this class have improved my ability to work in a team.
B4. I have confidence in my ability to put together several sources from different disciplines to complete an assignment.
C2. I am able to distinguish the value of information based on criteria I am given.

I1. The assignments in this class have helped me improve my ability to learn from classmates.
D2. I intend to continue learning on my own time.
E4. I have confidence in my ability to establish learning criteria.
C1. This class has improved my ability to evaluate material from different disciplines.
B1. This class has improved my ability to synthesize material from different disciplines.
F2. I intend to continue setting goals on my own time.
H4. Because of the methods of assessment in this class, I have more confidence in my ability to work on a team.
D1. This class has improved my ability to initiate research on my own.
A1. This class has improved my ability to integrate material from different disciplines.
E1. This class has improved my ability to establish criteria for things I wish to learn.
I4. Due to the assignments in this class, I have confidence in my ability to learn from my classmates.
H3. I am better able to work on teams due to the tests or presentations given in this class.
J2. I will seek to learn from my future co-workers more often as a result of the tests or presentations given in this class.
C3. Given a set of criteria, I can evaluate the extent to which material satisfy it.
A4. I have confidence in my ability to put together information from different disciplines to solve a problem.
F1. This class has improved my initiative to achieve education goals I set for myself.
A2. I can bring together information from separate disciplines to support a single assignment.
F3. I am able to set research goals without being required to do so.
C4. I have confidence in my ability to judge the usefulness of information I am presented with.
G3 I am able to work on teams more effectively due to the assignments I have had in this class.
D3. I am able to start research without being required to do so.
I2. I will seek to learn more from my co- workers in the future as a result of assignments I have completed in this class.
J3. I am able to better learn from my classmates due to the tests or presentations in this class.
F4. I have confidence in my ability to seek attainment of self set goals.
G2. Through assignments in this class I have learned to be a better team member.
B2. I am able to combine different concepts into an original concept of my own.

Appendix 4:

Survey Cover Letter

Management Science Learning Experience Survey

You are coming to the end of your academy career and this is an opportunity for you to make an input to the improvement of the curriculum within the Management Department. We are conducting research into what you have gained of value from being a student in various senior level management courses.

This survey will help us to determine what skills and abilities you have developed as the result of the course or courses you have taken. Because we do not have a large number of Management students, each of your inputs is very important to us. Please answer all of the items as honestly and candidly as you can.

Because the quality of this survey is directly dependent on the quality of your answers we are keeping your responses completely anonymous. Although we do ask for some demographic information from you for purposes of analysis, none of that information will serve to identify you individually.

We know that you have filled out many questionnaires during your time at the Academy and that often it seems the results are disregarded or ignored. This survey is an exception. The results you provide us are extremely important and we want to make sure that you have the opportunity to see what we are able to discover as a result of this research. If you would like a synopsis of the results sent to you, please fill out the form at the bottom of this letter and return this cover sheet to Major Abderhalden (DFM). As soon as we have tabulated the results, we will let you know how they came out. This will not only give you information about the research, but will allow you to compare your ideas about the management science curriculum with those of your classmates.

Thank you for taking approximately 20 minutes to fill out this survey. If you want to receive a synopsis of the results, fill out the following.

_____.
Name

_____.
Street Address or P.O. Box

_____.
City State Zip

Return this survey to Maj. Abderhalden (DFM) 6H94 NLT 1600 Wednesday 18 May 94.

Appendix 5:

Definition of Terms

Affective Domain: Division of Bloom's taxonomy which encompasses educational "objectives which emphasize a feeling tone, an emotion, or a degree of acceptance or rejection" (Krathwohl, Bloom, & Masia, 1966: 7).

Bloom's Taxonomy: Classification system developed to categorize educational objectives, Divides learning into three major domains: Cognitive, Affective and Psychomotor (Bloom and others, 1956), (Krathwohl, Bloom, & Masia, 1966)

Cognitive Domain: Division of Bloom's taxonomy which includes those objectives which deal with recall or recognition of knowledge and the development of intellectual abilities and skills" (Bloom and others, 1956: 7)

Experimental Course: Combination of three senior level management courses in the Management Department of the AF Academy into one nine hour course, Management 472Y, 475Y, 491Y. Taught using the relational teaching method.

Functional Courses: Classes in the management department which concentrate on one discipline and are taught using the traditional teaching method. Includes MGT 472, MGT 475, MGT 477, MGT 491.

Management 472 (MGT 472): A senior level management functional course focusing on the field and practice of Strategic Management. Worth three credit hours.

Management 475 (MGT 475): A senior level management functional course focusing on the principles of marketing. Worth three credit hours.

Management 477 (MGT 477): A senior level management functional course focusing on production and operations management. Worth three credit hours.

Management 491 (MGT 491): A senior level management functional course focusing on Management Information Systems. Worth three credit hours.

Management 472Y, 475Y, 491Y: An experimental senior level management relational course which combined aspects of MGT 472, MGT 475, and MGT 491 into a single class. Worth nine credit hours.

Relationa eaching Method: Term used by instructors in the AF Acade nagement Department to describe a pedagogy which co nes lecture, field trips, and case study/presentation to teach material across disciplines and encourages students to take responsibility for their own learning (McKinney Interview, 1994).

Relational Course: Another name for the experimental course, Management 472Y, 475Y, 491Y.

Traditional Courses: Another name for the three functional courses, Management 472, Management 475, Management 477, and Management 491.

Traditional Teaching M Pedagogy in which classes are taught using mostly le in one hour blocks, by a single teacher. Method used in st undergraduate classes at the Air Force Academy.

Appendix 6:

Suggested Course Sequence

The following is the suggested course sequence for management majors at the United States Air Force Academy.

The relational class combines Mgt 472, Mgt 475, and Mgt 491, into one three hour long class.

3rd Class Year	2nd Class Year	1st Class Year
Physics 215	Civ Engr 310	Astro 410
Econ 221	Engr 310	Engr 410
Bio 215	Law 320	Law 420
English 211	Econ 310	Open Option
Poli Sci 211	English 311	Beh Sci 375
Mgt 210	Philos 310	Mgt 437
EngrMech 120	Beh Sci 310	Mgt 446
El Engr 215	Mgt 301	Mgt 472
History 202	Mgt 371	Mgt 475/477
Math 220	Mgt 341	Mgt 491
Poli Sci 212	Mgt 342	Hum/Soc Sci Option
AeroEngr 215	Law 340/462	
	Mgt 361	

Note: 3rd Class Year = Sophomore Year

Source: Air Force Academy 1993-1994 Catalog (Page 119).

Appendix 7:

Elements of a Hypothesis Test

1. **Null hypothesis (H_0)**: A theory about the values of one or more populations parameters. The theory generally represents the status quo, which we accept until proven false.

2. **Alternative (research) hypothesis (H_a)**: A theory that contradicts the null hypothesis. The theory generally represents that which we will accept only when sufficient evidence exists to establish its truth.

3. **Test statistic**: A sample statistic used to decide whether to reject the null hypothesis.

4. **Rejection region**: The numerical values of the test statistic for which the null hypothesis will be rejected. The rejection region is chosen so that the probability is *alpha* that it will contain the test statistic when the null hypothesis is true, thereby leading to a Type I error. The value of alpha is usually chosen to be small (e.g. .01, .05, or .10), and is referred to as the **level of significance** of the test.

5. **Assumptions**: Any assumptions made about the population(s) being sampled should be clearly stated.

6. **Sample and calculate test statistic**: The sample is drawn and the numerical value of the test statistic is determined.

7. **Conclusion**:

   a. If the numerical value of the test statistic falls in the rejection region, we reject the null hypothesis and conclude that the alternative hypothesis is true. we know that the hypothesis-testing process will lead to this conclusion incorrectly (Type I error) only (100*alpha)% of the time when H_0 is true.

   b. If the test statistic does not fall in the rejection region, we reserve judgment about which hypothesis is true. We do not conclude that the null hypothesis is true, because we do not (in general) know the probability *beta* that our test procedure will lead to an incorrect acceptance of H_0 (Type II error).

Source: McClave, James T. and P. George Benson. Statistics for Business and Economics. New York: Macmillan Publishing Co., 1992.

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Vita

Second Lieutenant Kevin M. Kosefeski was born on 15 February 1971 in Philadelphia Naval Hospital, Philadelphia, Pennsylvania. After traveling to Germany, Virginia, and Japan, as a military dependent, he graduated from Portsmouth High School in Portsmouth, New Hampshire in 1989. In June of 1989, he entered the U.S. Air Force Academy and graduated with a Bachelor of Science degree in Management in June, 1993. Upon graduation, he received a regular commission in the USAF and entered the Graduate School of Logistics and Acquisition Management, Air Force Institute of Technology. After graduation from AFIT in September 1994, he will enter Aircraft Maintenance and Munitions Officer Course at Sheppard AFB, Texas. Upon completion of training, he will be assigned to the 33rd Maintenance Squadron, Eglin AFB, Florida.

Permanent Address:

187 Grant Ave.

Portsmouth, NH 03801

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	September 1994	Master's Thesis

4. TITLE AND SUBTITLE AN EVALUATION OF THE EDUCATIONAL EFFECTIVENESS OF A RELATIONAL COURSE COMPARED TO SINGLE TOPIC COURSES OFFERED BY THE MANAGEMENT DEPARTMENT OF THE UNITED STATES AIR FORCE ACADEMY

5. FUNDING NUMBERS

6. AUTHOR(S)

Kevin M. Kosefeski, Second Lieutenant USAF

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Air Force Institute of Technology,
WPAFB OH 45433-6583

8. PERFORMING ORGANIZATION REPORT NUMBER

AFIT/GLM/LAR/94S-24

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Department of Management
United States Air Force Academy
HQ USAFA/DFM
USAF ACADEMY CO 80840

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This study compares the educational effectiveness of two different methods of teaching three senior-level management courses at the United States Air Force Academy. The first method, known as relational instruction, combined Management Information Systems (MIS), Marketing, and Strategic Management into one three hour course worth nine credits. The team of instructors used a variety of delivery methods to present material. The second method of instruction employed single topic courses covering the same three topics as the relational course, taught by single instructors in one hour blocks using mostly lecture to deliver material. The literature review covered Bloom's taxonomy of educational objectives, the theory of self-efficacy, and the validity of self-evaluations. A forty item questionnaire was developed based on the Management Department's objectives for senior-level courses. The instrument was administered to all 74 senior management majors in the Academy's Class of 1994; 60 were returned (a response rate of 81%). No difference was found between the educational effectiveness of the teaching methods. It was recommended the Department base the continuation or elimination of the relational course on criteria other than educational effectiveness and that the Management Department adopt a more structured approach to experimental courses.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Teaching Methods, Education, United States Air Force Academy, Universities, Courses, Schools, College Students, Instructors, Training, Students	108
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL