THE RELATIONSHIP OF STATED LEARNING PREFERENCES, PERSONALITY TYPE, AND CAREER BACKGROUND TO ACADEMIC AND LEADERSHIP PERFORMANCE AT THE UNITED STATES AIR COMMAND AND STAFF COLLEGE

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Joseph Henderson Reynolds

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VITA

Joseph Henderson Reynolds, son of Dwight Ross Reynolds and Claire McMurry (Henderson) Jenkins, was born April 8, 1959, in Martinsville, Virginia. He graduated from Sumter High School, South Carolina, in 1977. He graduated from the United States Air Force Academy in June, 1982, with a Bachelor of Science in Electrical Engineering whereupon he was commissioned in the United States Air Force. He entered the University of Colorado in 1988 and graduated in 1990 with a Master's Degree in Telecommunications and Teleprocessing Science. He entered Troy State University Montgomery in 1994 and graduated in 1996 with an Educational Specialist Degree, General Education Administration. He currently holds the rank of Lieutenant Colonel in the Air Force and has been a student and, later, faculty member at the Air University's Air Command and Staff College. He entered Graduate School at Auburn University in 1997. He is married to Mary-Heather Camp, daughter of Dr. Lowry and Burr (Anderson) Camp, on June 30, 1984. He has eight children: Benjamin Lowry, Elizabeth Henderson, Samuel Dwight, Jacob Maxwell, Caleb Thomas, Sarah Isabell, Josiah Anderson, and John McMurry.

DISSERTATION ABSTRACT

THE RELATIONSHIP OF STATED LEARNING PREFERENCES, PERSONALITY TYPE, AND CAREER BACKGROUND TO ACADEMIC AND LEADERSHIP PERFORMANCE AT THE UNITED STATES AIR COMMAND AND STAFF COLLEGE

Joseph Henderson Reynolds

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This study examined the relationship of academic and leadership performance to three independent variables: stated learning preferences, Myers-Briggs personality type (MBTI), and career orientation. It also examined learning preferences by MBTI and investigated changes in learning preferences over a 7-month period in relation to MBTI, academic performance, and leadership performance. Statistical significance was examined at the .05 level for all studies. Subjects were active duty United States Air Force officers at the United States Air Command and Staff College (ACSC).

After experiencing the ACSC curriculum for 7 months, 301 subjects were administered an ACSC learning preferences survey to determine preferences for the school's methods. Data for the first two indicators of the MBTI (E/I and N/S) and career orientation (aircrew or nonaircrew) were gathered. Regarding academic performance, a

multiple regression combining all three independent variables was significant and showed that students not preferring ACSC's methods who have an IN MBTI and an aircrew status performed better. Individual variable analysis showed that only those with an aircrew background performed statistically significantly better in academics. Effect sizes for all GPA analyses weakly supported significant findings.

For leadership, a multiple regression showed that performance for aircrew students not possessing the IS MBTI was significantly better. Individual variable analysis revealed that leadership performance for both the aircrew and MBTI independent variables was significant. For MBTI, the IS group performed significantly poorer than the ES and EN groups. Effect sizes for significant leadership performance finding were moderate to weak.

MBTI was shown to be significantly related to learning preferences. The investigation's effect size moderately supported this conclusion. Follow-up analysis indicated that N type students tended to prefer ACSC's methods while S types did not.

To examine changes in learning preferences, the learning preferences survey was administered when students entered ACSC and 7 months later. For this analysis there were 72 subjects. EN and IN types significantly changed their preferences in favor of ACSC's methods while ES and IS types did not. Regarding academic performance, those who changed their preferences to either more or less favor for ACSC's methods performed significantly better. For leadership performance, there was no significant relationship to changes in preferences. Strong to moderate effect sizes supported all findings.

This study contributes toward the improvement of ACSC's curriculum and theories regarding curricula based on individual differences. It also confirms previous work regarding type theory and adds new insights about academic performance and preferences in relationship to MBTI.

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I want to first thank the members of my doctoral committee (Bruce R. Ledford, Frances K. Kochan, and Michael Kamen) for their consistent, timely, and insightful guidance throughout this study. Their informal yet professional direction not only challenged me, but kept me on even keel over the past three years. A special thanks goes to David Shannon for supervision in negotiating the assembly of statistical analyses included in this research. Also, thanks to Major Mike Foster for his computer wizardry at ACSC and helping me gather pertinent data. I also want to express my appreciation to my dad, mom, and buddy Matthew Figh: thanks for your concern, comments, and encouragement. A tender "I love you" to my wife, Mary-Heather, and eight children--their incredible patience through my bouts of anxiety, worry, and concern credits them with a large portion of this effort. Finally, if I can't use this in some manner to bring glory to God, then I suppose my efforts were in vain. I'm sure the Lord has reason for my working towards this degree--I look forward to finding and fulfilling His purpose.

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TABLE OF CONTENTS

Page

LIST OF TABLES xi

LIST OF FIGURES xiii

CHAPTER

I. INTRODUCTION 1

Curriculum Development and Theoretical Foundations
Statement of the Problem
Statement of Purpose
Definition of Terms
Research Paradigm
Research Questions
Hypotheses Tested
Design
Setting: The United States Air Command and Staff College
Significance of This Research
Theoretical/Conceptual Framework
Limitations of the Design
Organization of This Study

II. LITERATURE REVIEW 17

Research on Learning Preferences
Learning Preferences Defined
The Variety of Learning Preference Research
Germane Learning Preference Research
Summary: Learning Preferences and the Need for Further Research
Type Theory and Learning Preferences
Jung and the Theory of Psychological Types
Isabel Briggs Myers' Contribution to Jung's Work
The Myers Briggs Personality Type Indicator and Its Application to This Study
Summary: The MBTI and Application to This Study

Educational Philosophies and Methods at the Air Command and Staff College
Education at ACSC
The Theories Behind ACSC's Practices
The ACSC Education
Literature Review Summary

III. METHODOLOGY 56

Subjects
Procedures for the Protection of Human Subjects
Instrument Design and Development
Underlying Concepts Guiding Instrument Design
Instrument Validity Through a Panel of Experts
Pilot Study
Reliability
Data Collection Procedures
Pretest
Posttest
MBTI, Career Orientation, and Performance Data
Analysis of Data

IV. RESULTS 65

Instrument Development, Administration, and Reliability
Instrument Development
Instrument Administration
Instrument Reliability
Investigation of Hypotheses
Hypothesis Number 1
Hypothesis Number 2
Hypothesis Number 3
Investigation of Student Comments
Discussion of Student Comments
Conclusions About Student Comments

V. DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER STUDY 93

Study Overview
Instrument Development, Administration, and Reliability
Investigation of Hypotheses
Hypothesis Number 1

Hypothesis Number 2
Hypothesis Number 3
Analysis of Student Comments
Recommendations for Further Research
Limitations
Implications
Recommendations for Further Study
Summary of Specific Conclusions
Discussion
Grounded Curriculum
Learning Preferences
Type Theory
Student Learning and Performance
The Air Command and Staff College
Summary

REFERENCES 118

APPENDICIES 126

A. ACSC AY99 Demographic Facts
B. Auburn University IRB Package
C. Air University Survey Participation Approval Request
D. Headquarters Air University Research Approval
E. Headquarters Air University Survey Participation/Change Request
F. Headquarters Air University Survey Participation Change Request Procedures and E-Mail Acknowledgment
G. ACSC Curriculum Experts
H. Original Survey Instrument
I. Final Survey for Pretest
J. Final Survey for Posttest
K. E-Mail Announcing Administration of Posttest
L. Student Comments

LIST OF TABLES

Page

1. Elements of the Dunn, Dunn, and Price Learning Style's Model 25
2. Subscales on the NASSP Learning Styles Profile 26
3. Descriptive Statistics for Dependent Variables 69
4. Frequency Statistics for Career Background and MBTI Independent Variables. 70
5. Statistics for Learning Preferences Independent Variables 71
6. Regression Model Summary for GPA 73
7. MBTI Mean GPA Scores 73
8. Tukey Mean Difference Summary Table for GPA. 74
9. GPA Individual Independent Variable Conclusions. 75
10. Regression Model Summary for LPS 75
11. MBTI Mean LPS Scores 76
12. Tukey Mean Difference Summary Table for LPS 77
13. LPS Individual Independent Variable Analysis 78
14. Crosstabulations for MBTI and Stated Learning Preferences 80
15. MBTI and Stated Learning Preferences Follow-Up Pairwise Comparisons . . 80
16. Pre- and Posttest Preferences Means by MBTI 83
17. Mixed Model ANOVA: Changes in Learning Preferences with Regard to MBTI 84
18. Individual MBTI Analysis for Changes in Learning Preferences 84

19. GPA and LPS Means and Standard Deviations for Preference Change Groups 85

20. Proportion of Individuals Providing Written Responses by MBTI and Career Background 87

21. General Categories of Student Comments. 87

LIST OF FIGURES

Page

1. Figure 1 2

2. Figure 2 83

I

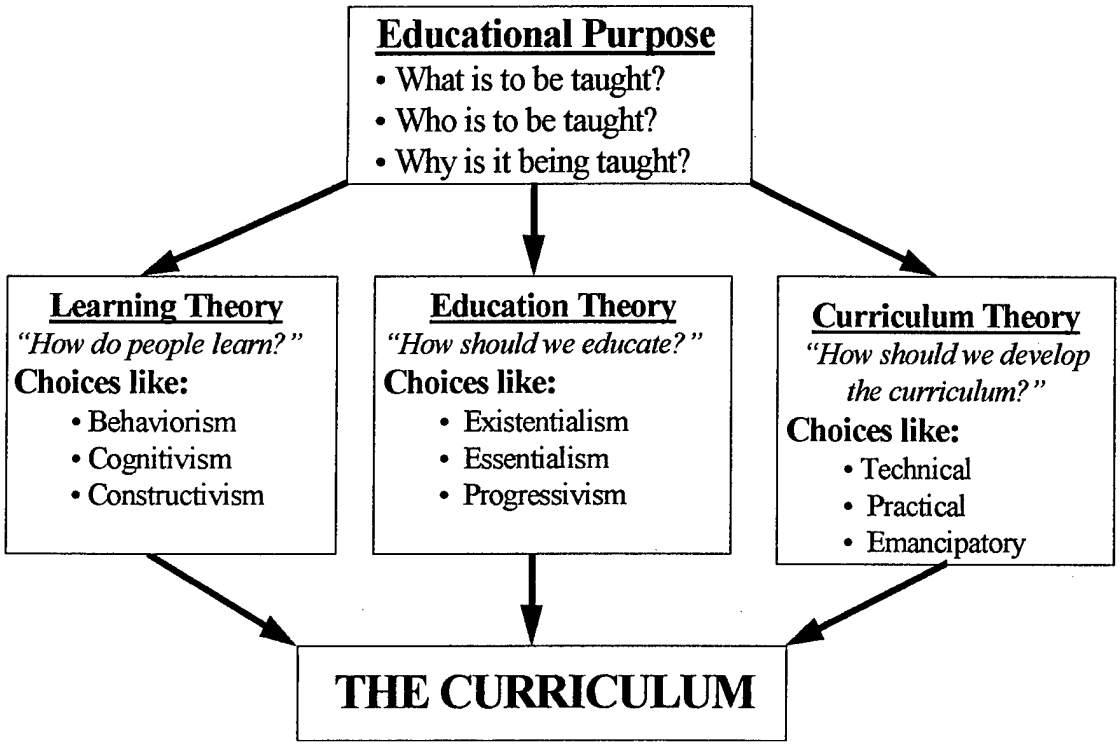
INTRODUCTION

Walker (1971) suggested that curriculum development is a decision-making process resulting in choices that mold a curriculum's unique character, and culminates in a design that is guided by the developer's platform and an ongoing process of deliberation. Walker noted that a platform consists of ideas that are not only political in nature but also, as he states, provide "something to stand on"; that is, personal views, principles, and convictions about "what is and a vision of what ought to be" (p. 52). Then it is through deliberation that choices are made about the development and design of a curriculum. Therefore, "[o]ne way to specify a curriculum's design is by the series of decisions that produce it. A curriculum's design would then be represented by the choices that enter into its creation" (Walker, 1971, p. 53). There is a dilemma, however, when making such choices. One might ask whether the curriculist's platform should embrace a consistent, grounded (Hannafin, Hannafin, Land, & Oliver, 1997) design process that logically links learning, education, and curriculum theories to attendant teaching methods, or whether the platform should focus primarily on individual differences and expand methodology to accommodate all types of learners.

At the United States Air Command and Staff College (ACSC) in Montgomery, Alabama, some difficult curriculum decisions were made in 1993 when the curriculum was completely redesigned around constructivist learning, essentialist education, and practical design philosophies. However, to this researcher, once a student and later a faculty member at ACSC, whether the school's well grounded curriculum provides adequate

learning opportunities for all types of students has been a persistent question. As a means to investigate this question, this study examined ACSC's student performance with a focus on personality type, stated learning preferences, and career background to determine whether identifiable groups of students perform equally on academic achievement and leadership performance skills taught at the college. Figure 1 explains the notion of a grounded curriculum and assists in describing the theoretical foundations of this study.

Figure 1. Grounding a curriculum based on choices among the foundations of learning, educational, and curriculum theory.



Curriculum Development and Theoretical Foundations

If curriculum is a series of choices, then something must be chosen from, and, because "[e]ducational practice is based on theoretical knowledge," the process "reduces

to choice among competing theories" (Phillips, 1981, p. 93). This idea of a theoretical foundation is not meant to slight other curricula inputs like resources, political, cultural, or community influences, but instead surfaces a similarly important point. That is, the curriculist, whether purposefully or not, has a platform and makes decisions based on contributions from learning, education, and curriculum theories. In turn, the developer should be versed in the plenteous supply of associated ideas, notions, and models since, as de Chambeau (1977) noted, "it is essential that adult educators reflect seriously on philosophical points of departure in the process of articulating program goals and objectives" (p. 308). If not, poor or uninformed decisions "may lead to significant inconsistencies in what is being done or, more importantly, in what is being demanded of a student" (Phillips, 1981, p. 93).

Referring to Figure 1, the task of grounding a curriculum in theoretical bases is simplistically depicted--simplistic because the decisions involved in curriculum design are complex, yet the depicted framework captures the essential theoretical considerations. An important initial step is much like the first of Tyler's (1949) four-question rationale used in curriculum and instructional development, "What educational purposes should the school seek to attain?" (p. v). This requires the developer to understand what is to be learned, by whom, and why in order to craft appropriate material. At this point, an understanding of learning theory becomes important and the complexities of curriculum development are manifest. Learning theory, or how people learn, portends an array of disparate ideas of which some notions might work better than others depending on the overarching educational purpose.

To make an appropriate learning theory choice, the curriculist negotiates the differences among various theories and might begin with a general distinction like Sprinthall and Sprinthall's (1990) and Sims and Sims' (1995) differentiation between behaviorist-associationist (stimulus-response) and cognitive-gestaltist theories. Yet, as one

attempts such categorizations, different formulations emerge: Kidd (1973) discussed behaviorism, psychoanalysis, and humanism while Hannafin et al. (1997) added constructivism and situated cognition as a third and fourth theory base along with behaviorism and cognitivism. In short, "[s]chools of psychological thought are so numerous and so varied in their viewpoints" that "no one theory is usable in undergirding all school activities and experiences" (Doll, 1982, pp. 51, 55). Finally, concerning learning theory, the less emphasized area of adult learning or andragogy requires investigation because, as Malcolm Knowles (1984) contended, adults learn differently than youths in at least six different areas: the need to know, the learner's self-concept, the role of experience, readiness to learn, orientation to learning, and motivation (Knowles, 1984).

Based on an informed yet personalized conception of how people learn, the curriculist's platform, as described by Walker (1971), starts to take shape. However, important too is an accompanying educational philosophy--how one believes a student should be educated--and the choices here are similarly complicated. For example, Schubert (1986) described six "'isms'...idealism, realism, scholasticism, pragmatism, naturalism, and existentialism" (p. 127). Similarly, Oliva (1992) represented the various philosophies of education as reconstructivism, progressivism, essentialism, and perennialism. Regardless of the philosophy one holds, "[a]t the heart of purposeful activity in curriculum development is an educational philosophy that guides action" (Wiles & Bondi, 1979, p. 68). This statement echoed the ideas of other scholars. As early as 1897 Dewey called for both logical and psychological considerations in curriculum with the latter focusing on how to appropriately educate a child (Dewey, 1988). Tyler (1949) emphasized that curriculists embrace a "psychology of learning" (pp.37-43). More recently, Zinn (1990) stressed the importance of a personal philosophy and its relationship to education. These authors stress the importance of a philosophy of education to help link a theory of learning to the rigors of curriculum development.

With an established educational philosophy informed by a concomitant theory of learning, the curriculist's platform (Walker, 1971) also should embrace concepts about curriculum development (see Figure 1). Just as there were differing views of learning theory and educational philosophy, so too with curriculum theory. Posner (1998) neatly categorized curriculum theory (and, by default, curriculum models) into two broad categories: the Technical Production Perspective featuring, among others, Tyler (1949) and Walker (1971) and the Critical Perspective with specific focus on the work of Freire (1970). Posner stated that the first (technical) perspective centers on deciding "such issues as instructional method and content, a matter reserved for people with technical expertise about the methods and content optimally suited for particular objectives" (Posner, 1998, p. 82). Thus, whether following popular ideas like Tyler's four-question rationale or Walker's concept of deliberation, these theories share the conception that curriculum should be produced by a select caste of experts, well-versed in curriculum making. Contrasting this was Freire's idea of emancipation or critical praxis where curriculum development is a much looser process that allows teacher and student to dialogue, critically reflect, and personally challenge the ideological underpinnings of societal impositions.

Posner's categorizations were not the only curriculum theory base requiring exploration. Schubert (1986), Mezirow (1981), and Grundy (1987) follow a similar categorization yet add the idea of a practical perspective between the technical and emancipatory extremes. This three-fold scheme had as its roots the work of German philosopher and sociologist Jurgen Habermas (cited in Grundy, 1987), substantiating curriculum's inherent linkage to philosophical thought. Thus it is clear that there exists a wide body of knowledge--with notable disagreement on the extremes--about how people learn, how people should be educated, and how the curriculum should be developed.

Figure 1 depicts theoretical influences contributing to a curriculist's platform for curriculum development. This framework assists in grounded practice and design which Hannafin et al. (1997) defined "as the systematic implementation of processes and procedures that are rooted in established theory and research in human learning" (p. 102). But, as Hannafin et al. noted, this does not argue "for the inherent superiority of one theoretical position or methodology over another, but for articulation of and alignment among the underlying principles that define them" (p. 103). In short, grounded practice suggests that curriculum should incorporate consistent choices in terms of learning theory, educational philosophy, and curriculum theory. Although this idea of linkage has merit, wholesale adoption of such methodology might disparage at least one foundation which may be preeminent regardless of platform--the concept of individual differences.

Statement of the Problem

In 1993 ACSC implemented a curriculum grounded in mostly constructive, essential, and practical theoretical constructs without regard for individual learner preferences. This study addressed whether this lack of attention to individual differences among students had an impact on student performance. If some types of students did not thrive in ACSC's unique environment because their learning preferences did not mesh with attendant pedagogical approaches, a curriculum bias might exist which may be detrimental to some students while advantageous to others. This is particularly problematic since the school's stated mission applies to all students: "Air Command and Staff College is a world-class team educating midcareer officers to lead in developing, advancing, and applying aerospace power across the spectrum of Service, Joint, and combined military operations" (Air Command and Staff College, 1998, p. 1).

Statement of Purpose

The purpose of this study was to investigate the ACSC curriculum to determine if certain identifiable groups perform statistically significantly differently than other groups at

the college. Specific focus was on personality type, stated learning preferences, and career background.

Definition of Terms

The following terms are unique to this study and require definition before continuing:

1. *GPA* refers to student Grade Point Average and uses the traditional 4.0 scale. This score represents the average academic grade achieved by each student in ACSC's ten-course curriculum and research project.

2. The *leadership performance score* (LPS) focuses on leadership, followership, encouragement, participation, and related interpersonal skills. This rating features the subjective judgments of each student's various instructors, operations staff, senior leadership, and the confidential recommendations of fellow students. Sixteen evaluations were conducted, and students earned leadership points commensurate with their individual evaluations. The final score could range from a low of 0.4 to a high of 8.2 (ACSC OI 36-108, 1998).

3. Air Force officers generally fall into two career background categories: *aircrew* and *nonaircrew*. In this study, aircrew officers were persons who either fly, navigate, or work aboard aircraft of any type. Nonaircrew officers were support staff who did not fly, navigate, or work aboard aircraft. This differentiation can also be referred to as rated and nonrated respectively or operational and support staff respectively. Regardless, these two groups are distinct and serve as two identifiable groups within the Air Force culture.

4. *Personality type* is a categorization of individuals in groups whose personalities, as measured by the Myers-Briggs personality type indicator (MBTI), have similar qualities. In this study, four MBTI indicator groups were used (ES for Extroversion-Sensing, EN for Extroversion-Intuitive, IS for Introversion-Sensing, and IN for Introversion-Intuitive).

5. This study differentiated *teaching method* from teaching style and focused only on method. In this study's context, teaching method is defined as the actual instructional delivery mode like lecture, interview, or case study while style is unique to the teacher--styles may differ even for the same teaching method.

Research Paradigm

This research study used mostly a quantitative methodology. In this approach, research begins with hunches or insights about something that are later adapted to some theoretical scaffolding from which the researcher posits hypotheses. These hypotheses are then tested in a controlled environment where context and variables that may impact research are reduced as much as possible. Data are gathered, analyzed, and generalizations--applicable to a larger population--are made. This is meant to contribute to the body of research and theoretical framework for subsequent investigation (Guba & Lincoln, 1989).

This researcher recognizes arguments for and against a quantitative paradigm; further, it may appear inconsistent to investigate a constructivist learning environment from a positivist vantage. However, ACSC's essentialist educational oversight (described in chapter II) dictates rigorous administrative supervision weighted heavily in positivist inclinations like student data collection, managed schedules, and careful performance monitoring. Couched also in a military milieu that values facts, figures, and definitive statements, the positivist approach fits the general culture in terms of data collection and presentation of findings. Finally, practically speaking, this researcher preferred statistical query due to extensive mathematical background, faith in numbers, readiness of collectable data, and wide acceptance of quantitative approaches in the field. Meriting mention, however, is this researcher's acceptance of either quantitative or qualitative methods; in fact, a small portion of this study uses qualitative measures. Both approaches

can be employed in credible research, yet the decision to use either paradigm rests in contextual and pragmatic concerns like those discussed here.

Research Questions

For this study, the following questions were posed:

1. After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by the combination of personality type, career background, and stated learning preferences?

2. After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by personality type?

3. After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by career background?

4 After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by stated learning preference?

5. Among ACSC's students, was there a statistically significant correlation between stated learning preference and personality type?

6. After experiencing the ACSC curriculum, did individual learning preferences change to a statistically significant degree?

7. If individual learning preferences changed after experiencing the ACSC curriculum, was there a statistically significant correlation with personality type?

8. If individual learning preferences changed after experiencing the ACSC curriculum, did changes statistically significantly correlate with academic and leadership performance?

Hypotheses Tested

These specific questions can be distilled to three hypotheses. The first hypothesis tested the first four research questions, the second hypothesis tested the fifth research question, and the third hypothesis (and associated follow-on hypotheses) tested the final three research questions.

1. No statistically significant differences exist between the academic and leadership performance of students having different personality types, career backgrounds, and/or stated learning preferences, tested at or below the .05 level.

2. No statistically significant difference exists between student personality type and stated learning preferences, tested at or below the .05 level.

3. No statistically significant difference exists between the stated learning preferences of students entering the ACSC curriculum and the same students after experiencing the ACSC curriculum, tested at or below the .05 level.

3.a. If learning preferences change, no statistically significant difference exists between personality type and changes in stated learning preferences, tested at or below the .05 level.

3.b. If learning preferences change, no statistically significant differences exist between changes in stated learning preferences and either academic or leadership performance, tested at the .05 level.

Design

This study used Myers-Briggs personality type indicators (MBTI), career background data, and a learning preference survey to group students. Performance data at ACSC included overall GPA and leadership performance scores. Also, the learning preference survey, designed specifically for the ACSC curriculum, was administered in a pre/post format and used to determine individual learning preferences as well as changes in preference once students experienced the curriculum. The independent variables for this study were personality type (MBTI scores--discussed in depth in chapter II), career background (aircrew or nonaircrew), and stated learning preferences (also described in depth in chapter II). Dependent variables were academic performance (final GPA) and leadership performance scores (LPS).

Setting: The United States Air Command and Staff College

Each year ACSC graduates nearly 600 military officers newly schooled in the understanding and employment of air and space power. This study investigated the performance of military officers attending ACSC during the 1998-1999 academic year. Among these are students from the various services (Air Force, Navy, Army, Marines) as well as officers from over 50 different countries. Because of the delicate nature of using personal data from international officers and officers from other services, this study considered only 387 active duty United States Air Force (USAF) officers.

With its origin traced to the defunct Air Corps Tactical School (1920 to 1940), ACSC is now a part of the USAF Air University which "'equip[s] officers with the knowledge and skills necessary for assuming progressively more important assignments in command and staff positions through the Air Force'" (Finney, 1992, p. 84). ACSC is but a portion of Air University, yet it has the distinction as America's only school for educating midcareer officers in air and space power. The curriculum lasts ten months, is comprised of ten graded courses and research, and, as described in the 1999 ACSC Curriculum Plan (1998, pp. 1-4), serves five overarching objectives:

1. First is a focus on command, producing people who understand air and space power and who can apply effectively these concepts while occupying leadership positions. The college uses case studies, exercises, expert lecture, and mentoring from more senior officers to nourish leadership potential in aspiring graduates.

2. Second, the college instills an understanding of the capabilities of air and space power. Prior to attending ACSC, students have spent ten or more years honing specific skills like computer programming, flying, or civil engineering. Few, however, understand the air perspective; that is, the depth and breadth of air and space power's unique capabilities. ACSC develops this perspective during the academic year with specific focus on planning and executing air operations in a joint service environment.

3. Simply understanding what air and space power can do is not enough, however. Our nation and its war fighters require airmen who can think creatively to forge air power solutions to realistic problems. Educating officers to apply creatively what they have learned, especially as a part of a military component or joint staff, is therefore another critical requirement in ACSC's charter.

4. ACSC prides itself on its educational environment and stresses top-quality resources, facilities, and technology. The maintenance of this environment remains a top objective.

5. Finally, the college constantly seeks superb faculty membership through aggressive recruiting, development, and mentoring processes.

These five objectives are implemented through the following educational philosophy:

> At ACSC we believe that the best way to learn is through an ACTIVE and COLLABORATIVE environment that facilitates knowledge, comprehension, and application of ideas. We also believe our curriculum and learning environment challenges [sic] students and faculty to CONSTRUCT MEANING, THINK REFLECTIVELY, and DEVELOP INTERNALLY while experimenting with a wide range of concepts, issues, and possibilities. (Emphasis as in original, Air Command and Staff College, 1998, p. 2.)

This philosophy exhibits notable trends in constructivist thought, essentialist practices, and links the school's theoretical foundations to a curriculum mostly informed by the practical interest. This point is important and is amplified in chapter II.

Significance of This Research

This research is important for several reasons. First, and most significantly, to a large degree our nation's survival rests in the hands of ACSC's graduates. Many of the college's past students have served in high positions within our armed services and have concocted military strategies instrumental in defeating, for example, Nazi Germany as well

as Iraq during Desert Storm. This research might unearth inconsistencies in the curriculum that, when corrected, will strengthen a program vital to our nation's security.

Another reason this study holds significance is due to the relatively limited amount of research in adult learning compared to childhood learning, especially regarding student performance with respect to a curriculum's theoretical foundation. This study appears to be the first investigation of adult student performance by personality type, career background, and learning preferences in a constructivist, essential, practical curriculum.

Also, if curriculum bias is evident--negatively impacting student performance--then this research will enhance the notion of grounded curriculum design, calling for special focus on individual differences regardless of a curriculum's theoretical underpinnings. This, then, could serve notice to curriculists who subscribe to a singular learning philosophy and associated education and curriculum theory. Instead, it would affirm that curriculists be well-rounded to accommodate individual differences: "[o]ne cannot work eclectically among learning theories without understanding the theories on which eclecticism is built" (Doll, 1982, p. 56). This research would therefore amplify Posner's (1998) assertion that curriculum planners should be competent with the technique of curriculum planning as well as conscious of the "assumptions underlying curriculum discussion"; that is, "[t]he field needs curriculum planners not only able to use various models but also aware of the implications of their use" (p. 96).

Theoretical/Conceptual Framework

This research explored many theoretical constructs. Theories about learning, education, and curriculum have already been mentioned, but two areas of thought are most persistent: grounded curriculum design and student learning preferences. The former has been discussed: grounded design rests on the premise that curriculum decisions inform and build upon one another in a logical fashion and are guided by certain theoretical foundations. This is the position espoused by Hannafin et al. (1997).

The other major theoretical construct, learning preference theory, has not been discussed. However, there exists ample research (e.g., Dunn, Beaudry, & Klavas, 1989) purporting that different people learn differently. Further, there are a variety of ways to investigate preferences: by personality type, by environment, by cultural heritage, by sociological preferences, by time-of-day, or by a number of other such variables. This researcher supports learning preference theory and will review pertinent ideas in the second chapter. Therefore, this research is constructed around the frameworks of both grounded design and learning preferences. It not only investigates the plausibility of grounded design, but will contribute to learning preferences theory with respect to personality type or type theory as originally espoused by Jung (1923) and later adopted by Myers and McCaulley (1985).

Limitations of the Design

Several limitations merit mention, primary of which is the nature of the sample population. As noted, a large portion of ACSC's student population was excluded (international officers and officers from other services). The remaining sample was somewhat homogeneous: all were USAF active duty officers, all were in mid-career status (ages ranging from 32 to 46 years), and most were male (337 of 387). Therefore, findings should not be generalized to other environments. This limitation was the researcher's choice: by focusing on USAF officers only, specific analysis of the curriculum's impact on air minded (not ground or sea), United States war fighters was possible and avoided influences inherent in cultural or service differences. There were also data sensitivities (mentioned earlier) that made the choice of only USAF officers less prone to obstacles.

Two of the independent variables also contained limitations. First, learning preferences were stated preferences and required individuals to state conditions which they thought correctly identified their learning preferences. However, it may be possible that what an individual stated was inconsistent with what he or she truly preferred. Also,

because this study used two of the four Myers-Briggs type indicators, it does not provide a complete personality profile. Finally, regarding the MBTI, strength scores were not included; therefore, an individual might, for example, exhibit slight, medium, or strong preferences for extroverted type, but this degree of preference is not provided.

Another limitation concerns ACSC's instructors. Butler (1997) points out that ACSC's faculty, though highly recruited and professional, are, by trade, military officers and not educators. Few have an education background, and, due to this lack in educational training, the faculty's ability to implement methods and strategies outlined in the school's curriculum plan and specific lesson plans might be questioned. However, Butler also argues that most instructors of adults do not have a background in education and that ACSC's instructors are not unlike those in many adult educational settings. In addition, while the curriculum dictated certain approaches, materials, methods, and experiences consistent with the college's overarching learning and educational philosophies, what actually happened in individual seminars was contingent on the instructor's ability and personal methods. This could reduce curriculum groundedness, that the theory in use (in some seminars) was not similar to the espoused theory.

Finally, the ACSC curriculum is very specific. It attempts to implement constructivist learning theory, an essential educational philosophy, and a practical curriculum. Thus, the ideas espoused here are applicable to curricula of this nature and cannot be generalized to all curricula.

Organization of This Study

This study consists of five chapters. This first chapter introduced the ideas of a curriculum platform and groundedness, described the context in which the study occurred, and stated the purpose and significance of this study. Chapter II describes published and related trends in learning preferences and personality type with a specific focus on matching instructional methods to student preferences and type. It also explains the MBTI

as well as the ACSC curriculum. Chapter III presents the methodology used to investigate the three hypotheses. Chapter IV provides collected data and presents statistical analyses. Chapter V contains this researcher's conclusions and assertions about this study's impact on the body of knowledge regarding groundedness and learner preferences while making recommendations for further study and specific speculations about ACSC's curriculum.

II

LITERATURE REVIEW

This literature review begins with an investigation of learning preferences, initially focusing on a definition of this broad concept. This is followed by an examination of both general and germane research about learning preferences. Pertinent studies about matching teaching methods with stated learning preferences as well as personality type are cited. Since this study used Myers-Briggs personality type indicators (MBTI), a brief review of Jung's work on type theory is also given. Included is an explanation of Isabel Myers' and Katharine Briggs' adaptation of Jung's work to the development of the MBTI and the use of MBTI in the context of this research. The third portion of this review provides a description of ACSC's curriculum.

Research on Learning Preferences

The idea that different people learn different things differently is not new. Claxton and Murrell (1987) trace the historical development of learning style or learning preference (the terms style and preference will be used interchangeably) research as far back as 500 B.C. to the spiritual pursuits of ancient Hindus. Today, educators appear to recognize that not all students learn in the same manner--as Jonassen and Grabowski (1993) ask, "Why are students better equipped to learn some skills but not others? Why can't all students learn all skills equally well?" (p. 3). Researchers also emphasize the importance of understanding learning preferences to improve educative practice (Dunn & Dunn, 1975; Sims & Sims, 1995) and some further cite studies showing improved performance and attitudes when preferences and teaching methods are congruent (Dunn et

al., 1989; Dunn et al., 1990; Dunn, Griggs, Olson, & Beasley, 1995).

Perspectives about individual differences in learning styles have changed over the years. Murray-Harvey (1994) asserted that

> The psychological literature on individual differences published during the late 1960s and early 1970s concentrated on the cognitive processing of information. Since that time, there has been a divergence in the approaches taken by different researchers toward the study of individual differences in student learning. (p. 1002)

This divergence has created an immense store of research about individual differences in learning that has branched to concepts like mental abilities, cognitive controls, cognitive styles, personality, prior knowledge, and learning styles (Jonassen & Grabowski, 1993). However, the most influential and lasting work regarding learning preferences occurred in the 1970s and 1980s with the work of Dunn, Hunt (1972), Keefe, Hill, and Kolb, among others, dominating the literature. Currently, there is a puzzling absence of new, fresh material. This section considers learning preferences or learning style and begins by defining the term.

Learning Preferences Defined

Most literature regarding learning preferences begins with a definition. This logical first step frames the context of the study, but, unfortunately, definitions differ, leaving the researcher "without a clear and readily usable concept of learning style" (Hyman & Rosoff, 1984, p. 38). Claxton & Murrell (1987) also warned, "it is important for researchers and practitioners alike to be clear about what aspect of learning preferences they are referring to when they use the term" (p. 71). This warning hints at a definitional basis that embraces several concepts, and, indeed, this is the case in most definitions. This review examines the variety of definitions about learning preferences.

The Various Learning Preference Definitions.

Several researchers provide short yet general learning preference definitions then follow with specific implementations of their

personal ideas. For example, in Shaughnessy's (1998) interview with Rita Dunn, Dunn noted that "[a] person's learning style is the way that he or she concentrates on, processes, internalizes, and remembers new and difficult academic information or skills" (p. 141). Earlier work by Dunn et al. (1989) also asserted that "[l]earning style is a biologically and developmentally imposed set of personal characteristics." Dunn's definition is broad and meshes with her now 23-element learning styles model--a model broken into five strands for emotional, environmental, sociological, psychological, and physiological preferences (Shaughnessy, 1998). Finally, Dunn's work has been captured in the Dunn, Dunn, and Price Learning Styles Inventory, which measures preferences among the 23 elements.

Kolb's work and his associated Learning Styles Inventory (LSI) are frequently cited and widely regarded. Jonassen and Grabowski (1993) summarized Kolb's learning styles definition "as one's preferred methods for perceiving and processing information" (p. 249). This definition supports Kolb's view that there are two learning dimensions: the concrete/abstract which deals with how individuals process information and experiences, and the active/reflective domain which is concerned with an individual's preference for perceiving information. (Sims & Sims, 1995) This general definition supported Kolb's assertion that individuals perceive and process information differently and led to his identification of four different learning styles: assimilators, divergers, accommodators, and convergers (Jonassen & Grabowski, 1993).

Finally, Jonassen and Grabowski (1993) paraphrased Joseph Hill's definition of the term cognitive style as "the way students receive and process information to derive meaning from their environment and personal experience... [and these styles] depend on their family background, talent, personal goals, and experiences" (Jonassen & Grabowski, 1993, p. 235). Hill's conception supported his cognitive style mapping (CSM) instrument, which considers four variables (symbols and their meanings, cultural determinants, modalities of inference, and educational memory) to diagnose an individual's cognitive

style. Then, using the results of the diagnoses, Hill's instrument led to adjusting "teaching methods and media... to the student's educational cognitive style" (Hill, 1976; cited in Jonassen & Grabowski, 1993, p. 235).

All three of these definitions supported the researcher's more immediate goal of diagnosing student learning styles. That is, these definitions were forwarded initially to assist in subsequent explanation of the theoretical underpinnings, design, development, implementation, and interpretation of each instrument.

Keefe (1988) offered a descriptive and lengthy definition, but also used it to assist in understanding another diagnostic instrument, the NASSP Learning Style Profile (LSP). In 1981 the NASSP sought to consolidate the various perspectives, notions, and theoretical work regarding learning style and arrived at the following definition:

> *Learning style indicates how a student learns and likes to learn.* Style characteristics reflect genetic coding, personality development, motivation, and environmental adaptation. Style is relatively persistent in the behavior of individual learners. It can change, but it does so gradually and developmentally. Learning style has cognitive, affective, and environmental [physiological] elements. Cognitive elements are internal controls of the information processing system that are trainable for more effective levels of skill. Affective and environmental elements are preferential in nature and can respond to both training and instructional matching strategies. (Emphasis as in original, Keefe, 1988, p. 2)

This definition led to the NASSP Learning Styles Task Force Conceptual Model in which cognitive, affective, and physiological dimensions formed three pillars supporting the concept of learning style. Notably, the Dunn, Dunn, and Price Learning Style Inventory was used for validity studies on the affective and environmental/physiological elements. Keefe's (and, by default, the NASSP's) definition has been cited as a comprehensive explanation of learning preferences (Jenkins, 1988; UNC at Chapel Hill, 1999). However,

Hyman and Rosoff (1984) criticized this definition in terms of behaviors. That is, specific actions exhibited by learners that indicate learning preferences are not addressed in Keefe's definition. Interestingly, however, every definition explored by Hyman and Rosoff (1984) succumbed to this or other criticisms.

Smith (1982) focused solely on adult learners and described learning style as "a person's highly individualized preferences and tendencies that influence his or her learning....[It] can be defined as 'the individual's characteristic ways of processing information, feeling, and behaving in learning situations'" (p. 17, 24). Later, Smith amplified his definition in the exact manner as Keefe, stating that learning style has three components: cognitive factors which are internalized mechanisms for handling information; affective factors which consider such things as expectations, motivation, structure, authority, and interest in subject; and environmental factors like room temperature, light, and time-of-day.

Similar elements are found in Lawrence's (1995) definition. He stated that learning styles had four psychological aspects: cognitive style, which described a learner's internal patterns for forming ideas; attitudes and interests; environmental preferences; and preferences for certain learning tools. Lawrence noted that learning style is a term "used variously and loosely in educational literature" and added that an individual's motivations and psychological type overlap with learning style (p. 38).

Curry (1983; cited in Claxton & Murrell, 1987; Hickcox 1995) defined learning style metaphorically using an onion model consisting of several levels, each progressing from the core to a subsequent, more general level. At the center is the most stable trait, an individual's personality. The next level is termed information processing, which is analogous to the idea of internal cognitive styles referenced earlier. After that is social interaction, which describes "how students tend to interact and behave in the classroom"

(Claxton & Murrell, p. 7). Lastly, the most volatile or changeable trait is instructional preference. These four levels interact to provide a framework of learning style.

Jonassen and Grabowski (1993) offered a similarly layered approach yet removed learning style as a separate entity. Their focus is on individual differences in learning, and they provide a framework consisting of four layers: cognitive abilities, cognitive controls, cognitive styles, and learning styles. Cognitive abilities anchor an individual's learning prowess--"competencies, the mental operations, and the kind of information being processed" (p. 174). At a more general level are cognitive controls that help "define processing characteristics that are based on task-relevant measures, that is, tests that measure the actual skill or tendency" (p. 233). Next, cognitive styles are "stable traits that learners employ in perceiving information and stimuli while interacting with their environment" (p. 173). Finally, most suspect are learning styles which "in effect, are applied cognitive skills, removed one more level from pure processing ability" (p. 233). Because learning styles are self-reported, Jonassen and Grabowski are cautious of validity measures. However, since many instruments (several mentioned earlier in this review) are based on pertinent psychological and pedagogical theory and because of the numerous studies using these instruments with subsequent validity measures, Jonassen and Grabowski place some confidence in learning style measures.

Summary: Defining Learning Preferences. Although this review does not cite all definitions provided in the literature, it does highlight some popular, accepted denotations. Several conclusions can be drawn from these different explanations. First, as Claxton and Murrell (1987) and Hyman and Rosoff (1984) point out, there is a need for clarity, agreement, and specificity in defining exactly what the term learning preference means. This researcher began with the simplistic idea that learning preferences indicated the various ways an individual learns best. However, and this is the second issue, the term *ways* is deceptively complex. For example, one might be concerned with the internal

cognitive processes, psychological type, external environmental stimuli, or classroom social interaction to determine styles or ways individuals prefer to learn. Further, each of these ways breaks into various (many measurable) considerations. Considering these first two issues, it is possible to accept the diversity of definitions, adopting the specific definitional focus for a singular study. This confirms Claxton and Murrell's (1987) admonishment to identify specific aspects of learning preferences guiding any study.

Answering Claxton and Murrell's (1987) call and concluding this section, this research examines stated learning preferences with emphasis on teaching methods used at ACSC. These methods include the use of technology, collaborative learning, and active studies (case studies and war game simulations). Further, this study differentiates learners by their MBTI, which is a measure of psychological type, as well as by their broad career path, which indicates psychological tendencies toward general occupations. It would be difficult to specifically categorize these investigations into one or another genera; however, this study loosely used the term learning preferences to indicate preferred classroom methods that are stated by individuals as well as intrinsically linked to one's psychological type.

The Variety of Learning Preference Research

Along with the diversity associated with the term, learning preferences, is a wide variety of areas open to research. Broadly speaking, however, this diversity can be grasped by reviewing the various instruments used and the different populations in which research has been conducted.

A Sampling of Learning Preferences Measurement Instruments. Although mentioned in earlier discussion, a more in-depth look at the instruments most used to diagnose student learning preferences reveals the magnitude of researchable areas. Five of the more popular instruments are the Dunn, Dunn, and Price Learning Styles Inventory; the NASSP Learning Styles Profile (LSP); Hill's Cognitive Style Mapping instrument;

Kolb's Learning Style Inventory; and the Myers-Briggs Personality Type Indicator (MBTI). All but the MBTI will be discussed here; the MBTI will be addressed in a later section.

Shaughnessy (1998) and Dunn, Beaudry, and Klavas (1989) note that the three most comprehensive learning styles models, and, by extension, the most comprehensive learning preference instruments, are those of Dunn, Dunn, and Price; Keefe (the NASSP conceptual model); and Joseph Hill. About these, Rita Dunn states, "[d]uring the past two decades, the most frequently used instrument in experimental research on learning styles, and the one with the highest reliability and validity, is the Dunn, Dunn, and Price" model (Shaughnessy, p. 142). This model has up to 23 different, measurable elements (some with further subdivisions) which can be evaluated to ascertain an individual's preferences. Depicted on Table 1, the Dunn, Dunn, and Price model includes five different stimuli and associated elements. Further, the instrument has been adapted for different learners (three different sets: K-2, 3-12, and adult learners) and has with it an ample supply of interpretation packages, publications, workshops, and literature (Learning Styles Network, 1999).

The NASSP instrument, based on the NASSP Learning Styles Task Force Conceptual Model, has 24 preference subscales as shown on Table 2. Actual development took nearly three years and involved over 7,000 students from over 55 schools in various successive refinements of the instrument. The end product was a 126-item tool, readable at the 5-6 grade level (Keefe, 1988). Not only are similarities with the Dunn, Dunn, and Price model noticeable, but the instrument itself is similarly encompassing.

Hill's Cognitive Style Mapping (CSM) inventory was one of the first developed, dating to the early 1970s and was the work of Joseph E. Hill, Oakland Community College (Bloomfield Hills, Michigan) president (Hickcox, 1995; Jonassen & Grabowski,

Table 1

Elements of the Dunn, Dunn, and Price Learning Style's Model

Environment	**Emotionality**	**Grouping**	**Physiological**	**Psychological**
Noise Level	Motivation	Alone	Auditory	Global/Analytic
Temperature	Persistence	With Peers	Visual	Hemispheric
Light	Responsibility	With Adults	Tactile	Impulsive/Reflective
Design	Structure	Collaborative	Kinesthetic	
		With Teacher	Time of Day	
		With Parent	Intake	
			Mobility	
			Energy Level	

Note. This table was developed using "Grouping students for instruction: Effects of learning style on achievement and attitudes," by R. Dunn, M.C. Giannitti, J.B. Murray, I. Rossi, G. Geisert, and P.Quinn (1990). . The Journal of Social Psychology, 130, (4), 485-494).

1993). This instrument has 216 items that measure 27 different elements. Further, these elements represent one of three broad areas: "symbols and their meaning, cultural determinants, and modalities of inferences" (Hickcox, p. 31). Hill also conceptualized a fourth variable, educational memory, but died before he was able to incorporate it into the CSM. Cognitive style mapping was Hill's first step in personalizing instruction. After the diagnoses, cognitive style is mapped and used to develop instructional strategies unique to the individual (Hill, 1976; cited in Jonassen & Grabowski, 1993, p. 244).

Finally, Kolb's model is based on ideas about experiential learning and the works of Lewin, Piaget, and Dewey (Jonassen & Grabowski, 1993). Kolb envisioned experiential

Table 2

Subscales on the NASSP Learning Styles Profile

Cognitive Styles	**Perceptual Responses**	**Study and Instructional Preferences**
Analytic Skill	Visual Perceptual	Persistence Orientation
Spatial Skill	Auditory Perceptual	Verbal Risk Orientation
Discrimination Skill	Emotive Perceptual	Manipulative Preference
Memory Skill		Early Morning Preference
Verbal-Spatial Preference		Late Morning Preference
Categorization Skill		Afternoon Preference
Sequential Processing Skill		Evening Preference
Simultaneous Processing Skill		Grouping Preference
		Posture Preference
		Mobility Preference
		Sound Preference
		Lighting Preference
		Temperature Preference

Note. This table was developed using "Development of the NASSP Learning Style Profile," by J. W. Keefe. In J.W. Keefe (Ed.), Profiling and Utilizing Learning Style (pp. 1-21). Reston, VA: National Association of Secondary School Principals.

learning as a cyclical, four-step model. Learning might begin through a "concrete *experience* that leads to *reflective observation* about the experience, then to *abstract conceptualization*, in which the observation is modeled, and then to *active experimentation*, in which the model is put into practice" (Emphasis as in original, Wynd

& Bozman, 1996, p. 234). Breaking this cycle into four quadrants, Kolb identified the individual learning styles of those who prefer one of the four steps over others (Accommodators, Divergers, Convergers, and Assimilators), and suggested instructional strategies within each quadrant. For example, for those favoring concrete experience, fieldwork, simulation, and laboratory work might be most preferential. Kolb's instrument consists of 12 items that require the rank ordering of four sentence completers each. The 1985 version was tested on 932 students and, more recently, this instrument has the distinction of stimulating the development of at least four additional learning preference inventories (Hickcox, 1995).

This summary of four popular learning styles instruments was meant to demonstrate the diversity and magnitude of researchable areas about learning preferences. This list is by no means complete; for example, Hickcox (1995) examines 18 separate instruments used for adult learners but states that there are "several hundred learning style inventories available in North America alone" (p. 37).

A Sampling of Learning Preference Research by Populations. Learning preferences are also investigated using a variety of populations. Some specify population in terms of subject taught. For example, Coker (1996) investigated physical education students, Krause (1999) focused on general chemistry students at Clemson University, and Pigg, Busch, and Lacy (1980) researched County Extension Agents. Other studies differentiate learning preferences by abilities, for example "gifted, musically and artistically talented, average, underachieving, at-risk, nontraditional, reading-disabled, special education, dropout, and adolescent psychiatric populations" (Dunn et al., 1989). Still other researchers categorize learning preferences by age or grade level (Carbo, 1984; Dunn et al., 1989). A popular learning preference grouping deals with ethnic or cultural distinctions (Dunn et al., 1989; Guild, 1994; Hickcox, 1995; Latham, 1997; Park, 1997). Although this review of the various learning preference instruments and populations is not

exhaustive, it is apparent that research about learning preferences is conducted using a variety of approaches.

Germane Learning Preference Research

The sizable field of learning preferences can be narrowed by investigating research related to the focus of this study. Since it is posited that adult learners differ from youths (Brookfield, 1986), this section begins by examining research regarding adult learning preferences Then the narrative branches to consider research about matching teaching methods to stated preferences and personality type, regardless of age group.

Research About Adult Learning Preferences. Comparing youths to adults, Brookfield (1986) differentiated adult learners as individuals who have "multiple roles and responsibilities," have accumulated life experiences, have passed "through a number of developmental phases in the physical, psychological, and social spheres," and have "experienc[ed] anxiety and ambivalence in their orientation to learning" (p. 30). But, as with any learner, adults "exhibit diverse learning styles--strategies for coding information, cognitive procedures, mental sets--to learn in different ways, at different times, for different purposes" (Brookfield, 1986, p. 31). Hickcox's (1995) survey of various adult learning preference instruments begins by defining an adult as an individual 18 and over. Although arguable, this dividing line establishes a basis from which one can review pertinent research about adult learning preferences. Hickcox continues her survey, categorizing 18 instruments according to the previously mentioned onion model; however, all that is offered is a description of the instrument along with its reliability and validity characteristics.

More germane investigation of adult learning preferences, with specific use of Kolb's instrument, is offered by Korhonen and McCall (1986). These researchers found a significant interaction between learning environment and learning style on adult academic achievement; however, neither learning style or learning environment alone accounted for

significant performance increases. Using Kolb's instrument, Pigg, Busch, and Lacy (1980) identified one dominant learning style (Accommodator) among County Extension Agents, but found "minimal correlations between individual learning styles and preferences for particular educational techniques " (p. 233).

Dunn et al. (1995) performed a meta-analytic validation using different studies based on the Dunn, Dunn, and Price instrument. Of 42 studies conducted during the 1980s, eight were performed using college or adult populations. It was found that adult learners had greater academic gains than elementary or secondary school students when learning style and teaching methods were congruent. Subsequently, the idea of matching style with technique showed promise in improving achievement. However, Murray-Harvey (1994), using a version of the Dunn, Dunn, and Price instrument with 423 adult learners, found problems regarding the instrument's claim to measure "stable, inherent characteristics of an individual" (p. 1002). Her study casts doubt on "the general notion of learning styles as stable attributes that are resistant to change" (p. 1012).

Wynd and Bozman's (1996) research using Kolb's instrument portrayed adult learners as exhibiting styles different from young learners and found that adults tend to be more practical in application and more focused on specific problems. The researchers' suggestion is to develop separate learning tracts or possibly different courses for different learners. They specifically isolate working adults as a likely target group. Similar results were found in an earlier study by Matthews and Hamby (1995). Again using Kolb's instrument, they compared over 6,000 high school and over 1,800 college students in terms of learning styles. Significant differences were found: "a greater proportion of high school students preferred the Assimilator and Converger styles than did college students and... a greater portion of college students preferred the Diverger and Accommodator styles than did high school students" (p. 259).

Research showing differences in learning preferences among adult learners was conducted by Loesch and Foley (1988). At DePaul University, 37 adults enrolled in a nontraditional, self-directed baccalaureate program were compared to 26 students in the school's College of Commerce program which uses a traditional curriculum. Significant differences were found in terms of desired structure: the nontraditional program's students preferred "to organize their own learning experiences, while... [the traditional] students show[ed] a greater preference for teacher-directed learning experiences" (p. 230). Finally, Smith (1982) cites several studies in adult learning preferences and concludes that "learning style is a viable concept with important implications for both adult educators and learners. The implications include possibilities for achieving better understanding of oneself as a learner and for helping others to facilitate one's learning" (p. 79).

Research About Matching Preferences with Teaching Methods. As explained above, research about adult learning preferences suggests that, among other areas, student performance can improve when matching learning preferences with instructional methods. In addition, some suggest that improvements in not only achievement but also attitudes and behavior are possibly linked to matching preferences with teaching method (Carbo, 1984; Dunn, Brennan, DeBello, & Hodges, 1984; Smith & Renzulli, 1984). Interest in matching learning style and teaching method is enhanced by statements like "[i]n every case [five separate research studies], students who were matched with methods, resources, or environments that complemented their reported strong preferences achieved statistically higher; they achieved statistically less well when they were mismatched with their preferences" (Dunn et al., 1984, pp. 12, 13). This section cites some research regarding matched preferences with teaching methods.

Wynd and Bozman (1996) used Kolb's learning styles instrument to investigate performance among 265 adult students. Using discrimant analysis, these researchers were able to successfully categorize learning preference type in a holdout sample using age and

grade point average (GPA) correlation coefficients with 70% success. The Accommodator style was academically inferior while Convergers showed strong correlation with high GPA. This being the case, Wynd and Bozman suggest that matching the preferences of the various styles with teaching methods would help bolster the learning of those whose styles are slighted.

Contrarily, Pigg, Busch, and Lacy (1980) used Kolb's instrument with 349 Kentucky County Extension Agents and found weak, nonsignificant correlations between techniques like lecture, individual study, group learning, audiovisual aids, and workshops with respect to Kolb's four different styles. Notably, achievement was not mentioned; only stated learning preferences were solicited.

Another study that challenged the notion of matching preferences with techniques was performed by Prorak, Gottschalk, and Pollastro (1994). Investigating the basic library skills of over 200 college freshman at the University of Idaho, these researchers divided instructional methods into two groups, one using collaborative learning methods and another the traditional lecture method. At course completion, no statistical difference was found in either test scores or library use confidence levels when method and preferences were matched. Considering, however, that this study looked at a specific element among many other elements, this does not discount the idea of improved learning through style matching. In fact, the meta-analytic validation by Dunn et al. (1995) for 42 different studies that used the Dunn, Dunn, and Price instrument suggested "that students whose learning styles are accommodated would be expected to achieve 75% of a standard deviation higher than students who have not had their learning styles accommodated" (p. 353). Remembering that Dunn, Dunn, and Price's tool includes up to 23 elements compared to the single element analysis by Prorak et al., this seemingly contradictory finding is explainable.

That some learning preference elements may or may not prove statistically significant in a singular study's context was shown by Price, Dunn, and Sanders (1981). In their analysis of 85 elementary school learners, Price et al. found significant differences in eleven of the Dunn, Dunn, and Price learning style inventory elements (at that time, there were 18 total elements) for students with high reading achievement levels compared to students with low reading achievement levels. These researchers suggested using these eleven preference elements as predictors of reading success and providing additional reading instruction for projected weak readers.

It is also interesting that while Prorak et al. (1994) did not find significant differences when investigating lecture versus group learning methods, Dunn et al. (1990) did find differences for young learners with regard to grouping (learning with peers versus learning alone). Among their conclusions, Dunn et al. note "that students permitted to learn through their [grouping] preference achieved statistically higher achievement and attitude scores" (p. 491).

Klavas (1994) noted improvements in attitude and achievement when matching learning preferences and methods. When instituting changes based on numerous self-reported learning preference elements for elementary school students in Greensboro, North Carolina, discipline referrals dropped from 143 to only 14 per year over a 2-year time period. Also, achievement on the California Achievement Tests rose from 30th and 40th percentile in reading and math respectively to the 83rd percentile in both areas over two years. Finally, Dunn and Griggs (1988) document successes in matching styles and methods after touring ten secondary schools in the United States. Not only were achievement improvements noted, but attitudinal changes, improved absence rates, and wide scale achievement recognition for the schools as a whole were also reported.

The literature about matching learning style with teaching methods is varied; some studies show significant findings in terms of performance, attitudes, motivation, and

behavior while others do not. Compounding this is the variety of instruments used and the populations tested. There is ample research to suggest that matching learning style with teaching methods can improve learning, but success seems to require applying the right techniques, at the right time, under the right circumstances, and measuring both learning and preferences with the right instruments.

Research About Matching Personality Type with Teaching Methods. Studies about the effect of matching teaching methods with personality type have yielded inconclusive results. In 1984, Smith and Renzulli noted that "[o]nly a small percentage of the studies carried out over the past two decades... have found teaching methods to be differentially effective for students with differing characteristics" (p. 46). The more recent research of Prorak et al. (1994) provided a similar remark. Citing 13 studies in their review of literature, Prorak et al. conclude that "research matching personality and teaching method has shown mixed results" (p. 493). Further, their research of college freshmen studying basic library skills found no significant relationship between the scores of learners experiencing a teaching method congruent with their personality type.

Similarly, Cooper and Miller (1991) investigated matched teaching styles with personality type among 113 college business students and 16 faculty. It was first noted that proportions of personality types were discongruent among faculty and students; for example, 48% of the faculty reported introverted-intuitive (IN) traits on the MBTI while only 11% of students reported the same type. More importantly, when faculty and student types were similar, final grades did not differ significantly for the matched group. However, student evaluations of the course and instructor did differ significantly with more favorable ratings when types were similar. Cooper and Miller conclude that grades fell toward the expected direction, and that "the results of this investigation do seem to support the importance of MBTI learning style-teaching method congruence as a potential intervening construct in the learning process" (p. 704).

Finally, Horton and Oakland (1997) hypothesized higher achievement for 417 students in the 7th grade when teaching methods matched their temperament as measured through the MBTI. Using four groups (SJ, SP, NT, and, NF), four different sets of lesson plans were developed and taught over a 13-day period to students falling within the appropriate grouping. According to Horton and Oakland, "[T]he findings provide little empirical support for... [the] theory that achievement is improved among students who receive instruction that utilizes teaching strategies which match their temperament-based learning styles" (p. 137). Interestingly, however, "some temperament qualities may contribute importantly to how students learn... [and] results did indicate that a strategy which capitalizes on personalization was superior to students of all types" (p. 139). What this means, Horton and Oakland conclude, is that while matching personality to teaching method is beneficial, additional considerations like culture, developmental issues, and teachers merit similar consideration.

Summary: Learning Preferences and the Need for Further Research

In 1981, Price et al. wrote:

> If we begin with the fact that most teachers verify that some methods work well with certain students but not with others, and that they also attest to the presence of individual differences among youngsters, then we can begin to explore how those differences may (or may not) respond to alternative methods. (p. 223)

Yet, more recently, Prorak et al. (1994) concluded that "the research is not clear on the effects of matching learning styles to teaching methods or on the best techniques to use" (p. 486). Thus, although having a multitude of research, the field of learning preferences requires further study. Notable improvements in achievement, attitudes, and (or) behavior when matching teaching methods with personality or learning styles have been mentioned. However, this review also exposed some research that challenges the value of such efforts.

For several decades researchers have been asking for more definitive research of the kind conducted in this study. Pigg et al. (1980) specifically called for research on the correlation between learning preferences and learning among adults. Claxton and Murrell (1987) specified a need to "clarify how much difference it makes if teaching methods are incongruent with a student's style" (p. v). Finally, as Horton and Oakland (1997) noted, there is a "paucity of empirical investigation" about matching personality type with teaching method, and this too is echoed by Prorak et al. (1994) (p. 137).

Sims and Sims (1995) stated that "higher education instructors cannot afford not to increase their understanding of learning and individual learning differences... [to leverage] student learning" (p. 10). Yet, as highlighted in this review, such understanding is difficult to achieve. Doyle and Rutherford (1984) expose possible reasons for such difficulty and agree with earlier assertions about the multitude of researchable areas and populations. Simply stated, there are numerous dimensions of learning style, and these interact with just as numerous contextual and pragmatic concerns like course content, measurement, teacher personality, culture, and a host of others. Against this backdrop, this research cannot begin to explain why different students learn different things differently. However, this study will contribute to the stated need for additional insight into adult learning preferences.

Type Theory and Learning Preferences

As noted by Geary and Sims (1995), an effort to match teaching methods with learning styles requires the identification of "factors that are most valuable and readily employed, to permit educators to make distinctions that lead to meaningful differences" (p. 119). Among the methods for identifying those factors, Geary and Sims recommend consideration of psychological type through the Myers-Briggs Type Indicator (MBTI). The MBTI is an instrument used to "characterize (as opposed to categorize) the fundamental styles that we use to deal with our life-encounters--cognitive style" (Barger &

Hoover, 1984). It is an instrument used to typify personality-related styles, and is one of the most popular tools available. As stated earlier, this research used the MBTI as one of three independent variables; therefore, it merits explanation and review.

Hickcox (1995) places personality as the core of the learning preferences onion model and defines it as the "underlying and relatively permanent personality constructs... [that inform an] individual's approach to adapting and assimilating information" (p. 36). Further, as Jonassen and Grabowski (1993) point out, many researchers view personality as an overarching concept that includes, among other things, individual differences and learning preferences. Since the MBTI is based on the work of both Jung (1923) and Myers and McCaulley (1985), personality type in this context is defined in Jungian terms as representing "the way we prefer to perceive and judge the information we encounter as we go through life adapting to situations" (cited in Barger & Hoover, 1984, p. 56).

This section begins with a brief discussion of Carl G. Jung and Isabel B. Myers. This is followed by an explanation of the MBTI instrument with specific descriptions applicable to this study.

Jung and the Theory of Psychological Types

Although known for his theory of personality type, Swiss psychiatrist Carl Gustav Jung (born in 1875) contributed to various fields including works about schizophrenia, alchemy, adult development, and even thoughts on the Christian faith. Influenced early by religion (his father and two uncles were clergymen), a somewhat solitary childhood as an only child, and early studies in medicine at the University of Basel, Jung transitioned to psychiatry in 1900 as a mental hospital medical assistant. Later, in 1907, Jung published The Psychology of Dementia Praecox, a study of schizophrenia. He sent a copy to Sigmund Freud and struck a friendship that lasted until 1913 when the two men sharply disagreed about the nature of the unconscious mind. Jung, hypothesizing the existence of unique, inherent traits (archetypes) that form the collective conscientious, violated Freud's

penchant for meticulous empirical methodology (Jung, 1923; Storr, 1983). Jung remained active, publishing and lecturing on a variety of topics, up to his death in 1961.

The work upon which the MBTI rests is Jung's 1921 book Psychological Types. Recalling Jung's definition of personality type--the way one prefers to perceive and judge information--two dimensions of personality emerge: perception and judgment. Jung further differentiated type into four functions ("*thinking*, *feeling*, *sensation*, and *intuition*") and postulated that the sensation (sensing) and intuition functions described how humans perceived information while thinking and feeling indicated the ways humans make judgments (Emphasis as in original, Jung, 1923, p. 14; Lawrence, 1995). These functions formed the essence of Jung's theory, "that seemingly random variations in behavior are actually consistent and orderly when one considers the different ways people prefer to take in information (their perception) and the ways in which they choose to make decisions (their judging function)" (Claxton & Murrell, 1987, p. 13).

Convinced that "every man is so imprisoned in his type," Jung (1923, p. 621) therefore theorized that "all conscious mental activity is either perception activity--awareness, taking in data--or judgment activity--making decisions about what has come into awareness" (Lawrence, 1995, p. 112). Amplified more broadly, perception is meant to describe how one becomes cognizant of occurrences, ideas, notions, and people while judging describes the methods for making conclusions about perceived information. The two ways of perceiving, sensing and intuition, include traditional information gathering methods through our five senses (sensing) and indirect ideas and associations linked unconsciously with external perceptions (intuition). Finally, when judging, one might use the logical, impersonal thinking function or the more subjective, personal feeling function (Myers & Myers, 1980).

With regard to the four functions, Jung (1923) stated that "[i]f one of these functions habitually prevails, a corresponding type results. I therefore discriminate

thinking, feeling, sensation, and intuitive types. *Everyone of these types can moreover be introverted or extroverted*" (Emphasis as in original, p. 14). Thus the four mental functions are manifest through either an extroverted or introverted orientation toward life; that is, through a focus on either the outside environment or toward "the inner world of concepts and ideas," respectively (Lawrence, 1995; Myers & Myers, 1980, p. 7). With this descriptor, Jung completed his theory of a three-dimensional personality structure: the perceiving dimension with the sensing and feeling functions, the judging dimension with thinking and judging functions, and the life orientation dimension with either an extroverted or introverted attitude. It is important to conclude, however, that individuals may possess attributes of all the functions, but that some functions will exhibit more dominant qualities.

Isabel Briggs Myers' Contribution to Jung's Work

Jung's work currently has an impact that many psychological theorists' efforts never will enjoy--his theory currently influences thousands of people thanks to the work of Isabel Briggs Myers. Myers put Carl Jung's work into application because "his type concepts had a bearing on the familiar daily problems of educating people, counseling them, employing them, communicating with them, and living in the same family with them" (Myers & Myers, 1980). Myers' work actually began through her mother, Katharine Briggs, whose unpublished research on personality closely paralleled Jung's, though not to the depth of the great psychologist. After several decades of research, Myers and Briggs produced the MBTI, first published by the Educational Testing Service in 1962. The instrument's popularity rose considerably in 1975 when publication was taken over by Consulting Psychologists Press (Lawrence, 1995).

Myers and McCaully (1985) are quick to point out that the MBTI was "built on certain statements by Jung" and that the tool reflects "Jung's theory as interpreted by Isabel Myers and Katharine Briggs" (p. 11). As such, Myers added a fourth dimension,

world orientation, to describe "identifiable attitudes and behaviors to the outside world" (p. 13). Although explicit in Jung's work, this orientation was never articulated to the depth of Jung's other three dimensions. However, as devised by Myers and Briggs, world orientation has a similar bipolar continuum: the perceptive attitude and the judging attitude. In order to deal with our world one can be perceptive--mostly sensitive to incoming information, seemingly pondering the options and opportunities available. The judging attitude, however, is one of planning, decisions, and closure; perception is terminated once sufficient information merits decision. With this fourth dimension, the MBTI is now explainable.

The Myers-Briggs Personality Type Indicator and Its Application to This Study

The MBTI is a multi-item inventory (between 50 and 166 items depending on version) that forces choice among four possible alternatives per item. Its validity testing involved over 5,000 medical students over a 12-year period. Some studies have challenged the MBTI's reliability, structure, and validity (Pittenger, 1993a, 1993b), yet reliability is described as good and validity is rated as strong in other studies (Hickcox, 1995; Myers & McCaulley, 1985). Although it exists in various forms (for example, an abbreviated version, a standard version, and a version for researchers), results from the inventory yield a four-letter preference identifier as well as a score indicating the strength of each individual preference. (Myers & McCaulley, 1985) The four letters correspond to the dimension, functions, and orientations described earlier: (E) extroversion or (I) introversion for the life orientation dimension, (N) intuitive or (S) sensing for the perception dimension, (T) thinking or (F) feeling for the judgment dimension, and (J) judging or (P) perceptive for the world orientation dimension. This study considers only the first two dimensions, life orientation and perception.

At ACSC the vast majority of officers exhibit the TJ preferences in the MBTI judgment and world orientation dimensions. In fact, over 80% of the officers at ACSC

reported thinking (T) in the judgment dimension alone. To even sample sizes and avoid statistical error, this research therefore considered only the first two dimensions (E,I and N,S). Discussion will begin by looking individually at the E, I, N, and S types and follow with an explanation of the ES, EN, IS, and IN pairings. Discussion will be in terms of learning preferences, providing descriptions of what research and theory say about these types in terms of their preferred methods of learning.

Notably, use of MBTI pairings is not unusual. Krause (1999) used ST, SF, NT, and NF pairings because they embrace the four functions, the root of Jung's work. Also, some research (Horton & Oakland, 1997) used SJ, SP, NT, and NF pairings because of their correlations to temperament theory as described by Kiersey and Bates (1984) among others. There is little research regarding this study's pairings. A specific study that used these pairings (Cooper & Miller, 1991) was cited earlier. Lawrence (1995) investigated over 130 research reports "that used the MBTI in studies of learning, teaching, and academic aptitudes," and provides a table specifically showing learning preferences (again, based on empirical research) corresponding to this study's exact pairings (p. 39). These reports, however, are brief and reveal nothing about student performance when preferences and personality type are matched.

Types and Learning Preferences. This section begins by reviewing what the literature says about the learning preferences of the E, I, N, and S types. Then, by combining these descriptions with more specific descriptions of the pairs in the literature, a brief learning preferences profile for each pairing is presented.

In the life orientation dimension, the extroverted (E) learner is sociable and enjoys group learning, appreciates breadth as opposed to depth, and benefits by discussing assignments with others, especially when writing. This would include brainstorming, group discussion, and, generally, thinking out loud (Kiersey & Bates, 1984; Myers & McCaulley, 1985). Lawrence (1995) also notes that E types prefer physical involvement in their

environment, plunging into their work and reflecting upon it later, and teachers who firmly manage dialogue.

On the other hand, the introvert's (I) forte includes reflection in solitary environments, preoccupation with inner thoughts and concepts, meditation, and reliance on the written word for studying. Observation, writing, listening, and labwork are preferred modalities. Finally, introverts ask for assistance reluctantly, do not find utility in experiential learning methods, and are sometimes regarded as nonparticipatory (Kiersey & Bates, 1984; Lawrence, 1995; Myers & McCaulley, 1985).

The perceiving dimension (S/N) is considered the most instrumental dimension with regard to learning preferences because it deals with a person's preferred way of acquiring information (Lawrence, 1995): "The intuitive [N] tends to perceive information holistically, often losing sight of details in favor of seeing a world of possible meanings" (Barger & Hoover, 1984, p. 57). Words like *imaginative*, *theoretical*, and *creative* describe intuitive types who prefer the abstract, more global perspective. Intuitive learners do not memorize well and often employ mnemonics, metaphor, and imagery in studies. Always looking for new inspirations, underlying concepts, and opportunities for original, inventive work, intuitives prefer self-instruction, contract learning with teachers, reading, stimulating lecture, and general concepts as opposed to detail (Kiersey & Bates, 1984; Krause, 1999; Lawrence, 1995; Myers & McCaulley, 1985).

Finally, the sensing (S) learner deals with realism, facts, task precision, and prefers experience to written, spoken, or theoretical ideas. Repetition, drill and practice, and dividing complex tasks into more manageable subtasks are frequent learning tools. Audiovisual aids also work well, and S types find memorization relatively easy. Learning is best accomplished in lock-step fashion, moving from the known to unknown when tackling abstract, theoretical ideas. To the S learner, skills and facts are educational products as opposed to assignments asking for speculation, possibilities, and personal

reflections (Barger & Hoover, 1984; Kiersey & Bates, 1984; Krause, 1999; Lawrence, 1995; Myers & McCaulley, 1985).

Individual Type Learning Preferences. This section describes the various learning preferences typical by the four type categories in this study. The ES type is described by Cooper and Miller (1991) as a concrete-active learner. Lawrence (1995) reports that ES types prefer time schedules, staying on time, "reports to class on topics selected by students," and "orderly work on goals set in advance" (p. 41). Extroverted-sensing students enjoy collaborative work and breadth, but trust facts and experiences even more than written or spoken words (Kiersey & Bates, 1984; Myers & Myers, 1980): "ES types have an interest in learning from 'real life' experiences, which leads them to place less emphasis on book learning" (Myers & McCaulley, 1985, p. 109). Memorization is a key learning tool for the ES learner as are audiovisual aids like television. Writing is more difficult for extroverts, and the sensing function requires gathering data that is verifiable and factual. Myers and McCaulley add that, theoretically, this type of learner will rank below all other pairings in aptitude scores since learning in most educational settings involves ideas and concepts, the domain of introverts, as well as abstract symbols and theory, an intuitive strength.

Cooper and Miller (1991) classify the EN learner as abstract-active. Lawrence (1995) cites data showing ENs as preferring "reading, self-instruction, working on group projects, meeting a lot of people, opportunities to be creative and original" and courses that allow students to take their own initiative (p. 41). Combining the individual descriptions presented earlier, the EN learner likes group and collaborative learning that focuses less on detail and more on finding insights, general concepts, imagination, and intellectual pursuits. Conversely, ENs are less likely to rely on internal, reflective ideas and theoretically would not thrive in environments that proceed step-by-step with focus on details and facts.

Intuitive-sensing (IS) learners are termed concrete-reflective (Cooper & Miller, 1991) portending a propensity toward individual, reflective learning of facts that are presented in orderly fashion and based mostly on validated detail and personal experience. IS learners like "demonstrations, labs, computer assisted instruction, films, [and] audio-visual aids" (Lawrence, 1995, p. 41). As intuitives, IS students prefer self-paced work and essay questions, but this is tempered by reliance on memorization and a strong desire for factual data before embarking on assignments that require generalizations (Myers & McCaulley, 1985).

Myers and McCaulley (1985) theorize that IN learners have the greatest potential in academic aptitude since "academic work requires the ability to deal with concepts and ideas (I), and with symbols and abstractions (N)" (p. 123). As abstract-reflective students, "IN types have the greatest *natural* interest in ideas and symbols" (Emphasis as in original, p. 107; Cooper & Miller, 1991). Lawrence's (1995) research revealed that INs are serious readers, like tutorials and independent study, and prefer systematic organization in coursework. Preferring individual work and opportunity for reflection, the IN learner might use journals, meditation, and situations affording solitude. These techniques would be used in an effort to gain general, holistic insights and discover innovative, yet nonspecific, relationships.

Myers and McCaulley (1985) report numerous studies about academic aptitude and achievement with regard to MBTI and, in some instances, of this study's four MBTI pairs. Both empirical data and theory suggest that performance favors IN types first, EN second, IS third, and ES fourth. Again, this is due to the nature of academic work which focuses on symbology and abstract concepts rather than learning through real experiences which would favor the ES student. "It is important not to conclude that ES types are less intelligent than IN types"; instead, what is suggested is that commonly used academic methods favor the IN type (Myers & McCaulley, 1985, p. 109).

Summary: The MBTI and Application to this Study

This review of the MBTI, in conjunction with the earlier review of pertinent research about matching learning preferences to personality type, reveals an area in need of further research. A popular tool, the MBTI instrument can be used in a variety of ways, but very few studies have employed the instrument in the manner undertaken in this study. The instrument's reliability and validity have made it a viable tool in measuring student personality type, and this study's extrapolation of four pairings and subsequent delineation of preferred learning methods has both theoretical and empirical support. However, as noted earlier, the pairings used in this study are atypical in the research literature. Thus, this present research charts a different course by using unique pairings as well as a focus on personality type with respect to achievement at an institution claiming a constructivist, essentialist, practical platform.

Educational Philosophies and Methods at The Air Command and Staff College

In chapter I it was asserted that ACSC claims to have a constructivist, essentialist, and practical curriculum platform. This section will substantiate that claim, beginning with a description of ACSC's curriculum. A review of constructivist learning theory, essentialist educational theory, and practical curriculum theory follows. It will be shown that ACSC's methods use the practices typical of these theoretical foundations.

Education at ACSC

The end of the Cold War and recent conflict with Iraq were powerful indicators that the world is changing. The United States Air Force leadership recognized this change and, among other things, mandated an overhaul of the ACSC curriculum. Selected to spearhead this effort in 1993 was Colonel John A. Warden, III, strategist behind the air campaign during Desert Storm. This researcher was among the first to experience the new ACSC curriculum, and, after graduating as a student, remained on faculty to implement many of Warden's innovative curriculum changes.

Change was so rapid and complete at ACSC that documentation regarding Warden's ideas, notions, and implementations is virtually nonexistent. What does exist, however, was documented several years later and actually represents the maturation of Warden's influence as well as the inputs of this researcher, numerous curriculum developers, department heads, and leaders in the ACSC chain of command. Primary among these is the Air Command and Staff College AY99 Curriculum Plan, a short, concise summary of the school's mission and educational philosophy (see chapter I); a brief discussion of resident and nonresident curriculum; descriptions and policies pertaining to faculty, staff, and students; and an abbreviated resident course syllabus.

In the ACSC curriculum plan it is noted that the curriculum is founded on four recurring themes: leadership, critical thinking, joint operations (military operations with other services), and research. Further, with an educational philosophy (see chapter I) that stresses collaborative learning, reflective thinking, internal development, and meaning construction, the curriculum plan alone proffers an educational environment atypical of traditional schemes.

ACSC Teaching Methods. Research by the college's Director of Curriculum and Technology Integration (Hukill, 1998) revealed that in 1998 ACSC employed five basic teaching methods: guest lecture, panel discussion, guided discussion, case study, and simulations. Overarching this framework was a curriculum built upon a thematic, building block approach in which one course prepared students for learning in subsequent courses. Finally, much of the curriculum is electronic: student syllabi, objectives, samples of behavior, evaluations, and some assigned readings are available through the school's local area network (LAN). Since Hukill's research, the curriculum has undergone some change, but the method descriptions provided below accurately reflect the curriculum for academic year 1999.

Although a hallmark of traditional learning, ACSC's use of lecture is distinctive, limited to about 35% of the school's methodology. Most lectures are given by noteworthy guest speakers (as a student this researcher enjoyed lectures by Alvin Toffler, Margret Wheatley, and Henry Kissinger, for example) as well as by recognized experts in selected military topics. Thus, unlike most institutions, instructors rarely if ever provided lecture.

Panel discussion, another ACSC teaching technique, is similar to lecture. Although representing only 5% of ACSC's curriculum, this method is used to bring opposing views in lively, moderated discussion. Used when ACSC students study the media's role in warfare as well as in their investigations of past leaders, panel discussions as well as lectures are recorded and transmitted through the Air University television network and made available in both real and requested time in every student seminar room and instructor offices.

Guided discussion occupies about 36% of ACSC's student time. Normally designed to follow guest lecture and panel discussion, this technique features the instructor as facilitator with twelve or thirteen seminar students discussing issues pertinent to the day's studies. Students are expected to have read the day's previous assignments, attended the lecture, and performed other assignments (multimedia applications, on-line reviews, or computer simulations) necessary to prepare them for the discussion. While in seminar, students connect individual notebook computers to access portals of the ACSC LAN to perform daily tasks like E-mail correspondence, note taking, critique of the day's lessons, and review of the academic schedule.

Case study and simulations occupy 9% and 16% of student activity respectively. Normally designed to complement previously studied theoretical foundations, these techniques stimulate creative thought by requiring analysis of real or scenario driven situations and deriving solutions to these complex problems. Studies involve careful

thought, planning, execution, and oral presentations and sometimes culminate in computer applications which simulate war.

ACSC's educational practices can be summed as featuring student interaction, collaboration, and exchange of ideas that are informed by stimulating lectures, readings, and technological applications like multimedia, E-mail, hypertext markup language (and associated browser), and some simulations. These techniques are employed to assist students in understanding the joint operations environment while fostering individual research, leadership development, and critical thinking--the four themes spanning an ACSC student's educational experiences. It is also believed that these methods enact the school's educational philosophy for internal development, meaning construction, and reflective thinking. Student evaluation employs several techniques such as oral presentations and multiple choice tests, but the vast majority of evaluation tools require writing research papers, journals, and essays.

The Theories Behind ACSC's Practices

Earlier discussion asserted that ACSC's practices are thought to embrace a constructivist view of learning, essentialist methods of educating, and a practical approach toward curriculum. Accompanying each of these theoretical strands is an enormous amount of literature, debate, and research. This section only briefly describes each foundation, providing sufficient reference to create a framework to understand the ACSC curriculum and this research study.

Constructivist Learning Theory. It could be argued that constructivism is nearly as old as mankind, traced to the time when apprentice-master relationships hallmarked the training and education of skilled craftsman (Brown, Collins, & Duguid, 1989; Lave, 1990). However, more formal explanation and scholarly description began with the near simultaneous works of Jean Piaget and Lev Vygotsky early in this century. Compared to more accepted learning theories (for example, behaviorism), constructivism occupied the

opposing end of a continuum about the very nature of reality and truth. It was this nature, this idea that truth and knowledge are constructed, that led to various unique constructivist concepts about human learning.

Constructivism is best understood by examining its fundamental premise. Constructivists view reality and truth as relative; therefore, one learns by constructing "knowledge from our experiences, mental structures, and beliefs" (Jonassen, 1991, p. 29). Subsequently, knowledge, truth, and wisdom are our "own personal interpretations of the evidences submitted to" us (Scheurman, 1998, p.6). In turn, this idea of personally constructed truth places constructivism squarely at one end of an ideological continuum regarding truth and reality.

> Jonassen (1991) balances this reality continuum with objectivism explaining that: Objectivists believe in the existence of reliable knowledge about the world. As learners, the goal is to gain knowledge; as educators, to transmit it. Objectivism further assumes that learners gain the same understanding from what is transmitted. Knowledge is stable because the essential properties of objects are knowable and relatively unchanging. (p. 28)

Scheurman (1998) extends this idea of an independent reality or absolute truth to the work of B.F. Skinner and behaviorist learning theory. To the behaviorist, learning occurs "when one person transmits the universal characteristics of reality to another" through the familiar S-R bond and reinforcement (Scheurman, 1998, p. 6).

To the constructivist, however, reality is based on experiences and "no one world is any more real than any other" (Jonassen, 1991, p. 29). While this view of relative truth might be unnerving, constructivists temper their view of reality on a scale of extremes. Some purport the wholesale rejection of what is real while others adapt constructivism in mostly higher-level thinking applications (Molenda, 1991). Regardless, "[i]n the broad sense, constructivism represents a shift in the perspective of the social sciences and

humanities from a view in which truth is given to a view in which it is constructed by individuals and groups" (Airasian & Walsh, 1997, p. 445). Thus constructivists profess a different view of learning, one that focuses on a learner's ability to construct personal meaning; however, even within the constructivist camp there is disagreement regarding the sources and methods of personal meaning making.

Literature categorizes constructivism on a continuum of its own. One side is rooted in the work of Piaget under the similar terms cognitive or developmental constructivism. On the other hand are Vygotsky's ideas commonly called social or situated constructivism. To the cognitive or developmental constructivist, the focus is on the internal process within learners that assimilates new information into existing mental constructs or accommodates new information into a rearranged mental scheme. Hence, learners construct meaning (reality and truth) by either assimilating information into what is already known or accommodating information into a now modified version of personal knowledge. Piaget believed that these internal "forms or structures of knowledge" were universal and called the processes of assimilation and accommodation cognitive equilibration, which is "a dynamic process of self regulated behavior" (Fosnot, 1996, p. 13; Scheurman, 1998, p. 8). Finally, while equilibration is a process common among learners, the resulting constructs and realities are quite different among individuals.

Critics of cognitive constructivism cite the exclusion of external, contextual issues, particularly sociocultural influences. Among these critics are the social or situated constructivists who emphasize "the social construction of knowledge and rejects the individualistic orientation of Piagetian theory" (Airsian & Walsh, 1997, p. 445). They stress that knowledge is coconstructed thorough a learner's collaboration with other individuals and society as a whole, representing what a culture has derived through the years. This knowledge is captured through symbology like alphanumeric symbols and musical annotations. Fundamental to learning is the zone of proximal development which

describes the gap between what a learner can accomplish autonomously and what he can accomplish with help. Working to decrease this zone, learners eventually master a culture's symbology and are likened to skilled craftsman, ready to construct new knowledge by adapting these tools to the environment (Gredler, 1997).

Regardless of their theoretical leaning--cognitive or social--constructivists agree that knowledge, truth, and reality are relevant only to the individual, and that a person is always under construction because new information alters existing knowledge. Disagreement comes in the source of construction. Most theorists suggest that Vygotsky would attribute learning more to an external, socioculture interaction while Piaget would focus more on an internal equilibritive process. However, De Vries (1997) makes a case for Piaget's concern for social influences while Scheurman (1998) asserts that Vygotsky accepted "Piaget's view of how individuals build private understanding of reality," adding that "Vygotsky further explained how social or cultural contexts contribute to a *public* understanding of objects and events" (Emphasis as in original, p. 8).

What emerges from this discussion is a combination of sorts that echoes Fosnot (1996): "The important question to be asked is not whether the cognizing individual or the culture should be given priority in an analysis of learning, but what the interplay between them is" (p. 23). Answering her query, Fosnot (1996) concludes with a constructivist model that depicts an interplay between the individual, symbology, other individuals, and various media. Her insistence on incorporating elements of both Piaget and Vygotsky is argued with statements like "knowledge and the mind cannot be separated" (Piaget) yet "humans are social beings" (Vygotsky) making the case for such a synthesis (p. 25).

In short, then, constructivism is "a psychological theory... that construes learning as an interpretive, recursive, building process by active learners interacting with the physical and social world" (Fosnot, 1996, p.30). To the constructivist, knowledge is actually produced by the learner rather than something to be grasped. This theory

therefore serves a broad worldview that diminishes the traditional idea of absolute truth and knowledge held by the positivists, and replaces it with relative, personally constructed realities. Adopting a combination of cognitive and social constructivism, therefore, the conclusion is that learning is accomplished through active construction of personal realities and truths by using innate capabilities while interacting within one's sociocultural context (Molenda, 1991). This also implies that constructivism is actually an epistemology (the study of how people learn), and neither a description of effective teaching methods or a philosophy for curriculum development (Airasian & Walsh, 1997).

Essentialist Educational Theory. Unlike constructivism and other theories about how people learn, theories of education are more easily defined and less debated from a definitional standpoint although selecting one theory of education over another would probably solicit debate. If an institution's philosophy of education focuses on the "transmission of cultural heritage... [seeking] to adjust men and women to society," then this notion is broadly termed essentialism (Oliva, 1992, p. 197). Typifying essentialist practices are organized, subject matter courses that value the preparation and equipping of students for some future endeavor like college or skilled labor. Essentialist practices also feature firm management from a central administration as well as curriculum control (Oliva, 1992).

Centralized curriculum control implies rigorous selection of what will be taught as well as the identification of the behaviors expected once learning occurs. This suggests that a behaviorist theory of learning (not constructivism) is better embraced by essentialism; further, Oliva (1992) asserts that "essentialists found the principles of the behaviorist school of psychology to be particularly harmonious with their philosophical beliefs" (p. 197). This leads to a curriculum that uses behavioral objectives as well as sequential instruction that moves from rules, ideas, or models to application and practice.

The Practical Curriculum Interest. Grundy (1987) defines curriculum as either product, experience, or praxis and, as stated in chapter I, links these three descriptors to the ideas of philosopher Jurgen Habermas. In the practical realm, curriculum focuses on experiences with the purpose of "*understanding the environment through interaction based upon a consensual interpretation of meaning*" (Emphasis as in original, p. 14). As such, a practical curriculum does not seek to manipulate or control the environment, it simply seeks an understanding and has at its roots "subjective rather than objective knowledge" (p. 14). To gain knowledge, the practical curriculum relies on hermeneutic techniques: inquiry, meaning making, interaction, deliberation, consensus, and interpretation typify learning practices.

These practices in turn connote a social process in which meaning is derived through communicative procedures like collaboration, brainstorming, and discussion overarched by an environment open to all ideas. Hence, four commonplaces--mileu or environment, student, subject, and teacher--blend to create something different and unique for each student, that is, an experience (Shubert, 1986). The practical curriculum is not a thing (product); rather, it is an experience, personally derived by the interaction of the four commonplaces. High marks would go to the individuals who articulated positions, ideas, and notions with an affective, enthusiastic tone and that defended positions with sound, logical argument.

Summary: Blending Constructivist, Essentialist, and Practical Thought. Although Figure 1 (chapter I) depicts a clean, distinct separation of theories of learning, education, and curriculum in creating educational environments, the short descriptions of specific theoretical roots provided above creates a more confused, perhaps mixed picture. These three foundations, whether of the variety described here or of other schools of thought, actually blend in unique proportions to formulate an educational experience particular to that institution--in this case, ACSC. A constructivist, essentialist, practical foundation is

actually a strange mix, however. Constructivist learning theory meshes well with a practical curriculum because the two focus on collaboration and meaning making with attention to personally derived knowledge, not empirical, fact-filled methodologies. However, the essentialist's bent toward objective-based, firmly managed practice requires creative applications to ensure an overall grounded design consistent with constructivist, practical views.

The ACSC Education

That ACSC embraces constructivist thought and a practical curriculum interest is reflected in its earlier described institutional goals, broad curriculum themes, educational philosophy statement, instructional methodologies, and evaluation practices. The school is also directed to administer curriculum in an essentialist fashion under the Instructional System Design paradigm and is therefore heavily tied to objectives development, delineation of teaching methods, carefully contrived and scrutinized lesson plans, and a firmly managed academic experience. These requirements are steadfast; in fact, simply reviewing the school's educational philosophy in chapter I reveals reliance on three elements from Benjamin Bloom's cognitive taxonomy (knowledge, comprehension, and application), a mainstay in educational objectives development.

ACSC's charter is to produce flexible, critically thinking military leaders. This has spawned an environment where personal meaning construction is encouraged. Also, social processes that favor a Jungian extrovert (E) are in place with emphasis on deliberation, collaboration, and interaction to understand the environment in which military officers operate. Coupled with that is a reliance on stimulating lecture, reflection, serious reading, and written evaluation tools that use techniques favorable to intuitive (N) types. Conversely, the school is firmly managed, employing a systematic, essentialist educational philosophy that meshes better with sensing (S) types. The methods used at ACSC, whether in curriculum development or actual enactment, balance with the tenets of a

constructivist, essentialist, practical platform. ACSC's theoretical linkages are unusual and worthy of research in another study; however, these are the claimed foundations guiding the education of midcareer United States military officers at the Air Command and Staff College.

Literature Review Summary

This literature review analyzed three topics related to this research. First was a discussion about learning preferences and it was shown that this concept connotes a variety of meanings that are mostly contextually driven. Further, although there exist numerous studies about learning preferences, the breadth and depth of the topic has diluted research, resulting in a variety of instruments, measurable populations, and disparate, sometimes conflicting, results. Evidence suggests that accommodating student learning preferences can improve attitudes, performance, and motivation making it a topic worth continued exploration. This is especially true for the Air Command and Staff College where adult learners are educated to lead in difficult, life-threatening environments.

Type theory and its relation to learning preferences was discussed next. This research used the Myers-Briggs Personality Type Indicator, an instrument used widely with acceptable validity and reliability measures, to measure ACSC's student personality types. This study takes a unique approach in using the ES, EN, IS, and IN pairings due to the population's size and bias toward the T and J types. Further, this study correlates academic and leadership achievement with personality type and stated learning preferences among a group of mature adults. No study has ever taken this route.

Finally the ACSC curriculum and total educational experience was described. It was shown that the college exhibits tendencies toward constructivist learning theory, an essentialist educational approach, and practical curriculum methods. This approach was

described by enumerating the school's teaching methods, educational philosophies, curriculum themes, and evaluation techniques.

These three topics (learning preferences, type theory, and the ACSC experience) combine to forge the background for this research. Chapter III describes the methodology used in assessing ACSC student performance in terms of stated preferences, personality types, and career orientation.

III

METHODOLOGY

As pointed out in the literature review, there is a wide variety of research regarding learning preferences, yet there exists some disparity in results. However, there is sufficient evidence that students appear to respond to practices that appeal to individual learning styles to make the topic worthy of continued investigation. Further, previous chapters noted that this study's analysis of stated learning preferences, type theory, and general occupational background in an adult environment claiming constructive learning, essentialist practice, and practical curriculum foundations is unique in several ways. Most important among them is the analysis, development, and refinement of a curriculum directly supporting our nation's security.

Data were gathered systematically over a one-year period. The first step was the development of the ACSC learning preferences survey. Over the year, milestones were established and met. These included the administration of the survey in a pretest format, readministration of the instrument in a posttest format, collection of Myers-Briggs and general occupation data, gathering data about student performance, consolidation and analysis of data using SPSS 7.5, and review of student comments. The processes and the various activities associated with this study's method are described in this chapter.

With thorough portrayal of the institutional setting and educational practices at ACSC already provided in chapters I and II, this chapter begins with a look at the subjects involved in the study and the procedures used in protecting these subjects, an important step in ensuring ethical and valid research processes. Next is a description about the

ACSC stated learning preferences survey developed for this study. Data collection procedures used to gather all information are also described. This chapter concludes with a short narrative about the statistical and qualitative procedures used to analyze the data and investigate the three hypotheses.

Subjects

Appendix A provides specifics regarding the ACSC AY99 (Academic Year 1999) class. Although the entire ACSC class consisted of 594 officers and civilians from USAF, US Army, US Navy, US Marine Corps, Department of Defense, and international affiliations, for this study, subjects were exclusively United States Air Force (USAF) Officers ($n = 387$).

The ACSC USAF officers exhibited some diversity in career background (see Appendix A), yet were homogeneous in several ways. All had college degrees with over 90% also having completed postgraduate work. All were in midcareer status, ranging in age from 32 to 46, and had between eleven and fourteen years commissioned military service. All officers received their commission through one of three sources: the United States Air Force Academy, the Air Force Reserve Officer Training Corps, or the Officer Training School. Well over 90% of the subjects were graduates of Squadron Officer School at Air University. Finally, there are 337 male and 50 female subjects.

Procedures for the Protection of Human Subjects. Literature about basic research methods often includes sections describing ethical and moral practice (see, for example, Dooley, 1994, and Howard, 1985). This is a vital precaution in research, especially when dealing with human subjects. Because this research investigated human subjects, their learning preferences, personality type, and occupational data as well as their performance at ACSC, steps were taken to ensure that no ethical lapses occurred with regard to their protection.

Initially, this researcher sought research approval through the Auburn University Institutional Review Board (Appendix B) but was advised that because subjects were all military officers, approval must be gained through appropriate military channels. A similar package was therefore forwarded to Headquarters Air University at Maxwell Air Force Base, Montgomery, Alabama (Appendix C). Approval was given and a Survey Control Number (SCN) was issued--AU SCN 98-35 (see Appendix D). ACSC, a subordinate organization to Air University, likewise issued an SCN, ACSC SCN 99-02.

To permit administration of the posttest in person, a change request was submitted to Air University since the original approval stipulated electronic administration (see Appendix E). The change request was in accordance with E-mail instructions detailed in Appendix F, and, as the appendix shows, the change was received and acknowledged, but not issued a new SCN.

Once data were consolidated in SPSS, the master data file was manipulated to delete references to individuals Instead, identifying data were replaced with case numbers making it impossible to correlate an individual's response to survey questions, Myers-Briggs data, career orientation identifiers, academic performance, and leadership performance. Surveys were then archived and will be destroyed one year after completion of this study. In the interim, all data will remain confidential to this researcher.

Instrument Design and Development

Part of this research included the design and development of a short survey that measures ACSC student stated learning preferences. An initial review of survey design (Salant & Dillman, 1994) revealed that brevity, straightforward wording, and an ample response rate should be key features of this instrument. In addition, measures were taken to assure that the instrument was reliable and valid. This section describes these requirements and the specific procedures to meet them.

Underlying Concepts Guiding Instrument Design. Good instrument design requires that survey questions be worded in simple, easy to understand language, yet one of the major difficulties in designing this instrument was phrasing items for individuals whose backgrounds did not include professional education, much less education theory. It was felt, however, that response rate would increase if the survey was short and simple. Further, because these questions contributed only part of this study's data, it was not essential to explore the depths of individual learning preferences; instead, it was important to measure preferences for ACSC's methods.

Hukill's (1998) research provided much evidence to craft survey questions applicable to ACSC as did this researcher's experience at ACSC and his background in learning, education, and curriculum theory. Since this instrument was meant to measure student preferences for ACSC's methods, it was not necessary to develop complex items. As noted in chapter II, ACSC features active techniques like case studies, wargames, and stimulating lecture; informal practice through collaborative classrooms with shared experiences facilitated by course instructors; personal construction of knowledge and open-ended evaluation; and tools exhibiting heavy technological reliance. Survey items therefore asked whether students preferred these methods or not. Although the methods could be traced to underlying theoretical themes, items were specifically written to measure student preference with respect to what ACSC actually did during the academic year. Also, at the end of the survey, a general comments section was included to provide some qualitative input to the overall study.

Instrument Validity Through a Panel of Experts. A draft survey was sent to four experts in ACSC's curriculum, educational philosophies, and academic processes. These individuals, described in Appendix G, were asked to revise and edit the instrument to be sure it included the crux of ACSC's methods. This panel review assisted in assuring content validity, an essential step in instrument design. The purpose of content validity is

to affirm that an instrument's "items are a representative sample of a larger group of items from which the experimenter could have selected" (Howard, 1985). Subjective in nature, content validity is most often supplemented with more rigorous validity measures like criterion and construct validity. However, the nature of this instrument lended itself solely to content validity since no criteria exist for correlation of this instrument to another for criterion validity and since no theory or underlying construct is tested or reaffirmed as is the purpose of construct validity (Dooley, 1990). Instead, what was sought was an instrument that accurately assessed student preferences for ACSC's methods. Thus, in this case, content validity was considered as the most appropriate validity measure.

Pilot Study. A pilot study was conducted using the panel-edited version of the survey to refine the instrument. The participant group for this study, conducted in early August 1999, consisted of 50 students who arrived early at the college to receive training as the senior leadership among ACSC's students. These individuals were given a description of the study's purposes, asked to take the survey, and were encouraged to add comments regarding readability, clarity, and instrument objectiveness. These students also had the opportunity to participate in the formal study.

Reliability. Reliability is the measure of consistency among items within the test (Dooley, 1990). For this instrument, an unreliable test would exhibit random answers; that is, on some items students might select answers that indicate preferences for ACSC's methods, yet on other related items they might select responses that indicate dislike for ACSC's methods. This instrument's reliability, reported in chapter IV, was measured using coefficient alpha which assesses consistency among all items in an instrument (Howard, 1985; Dooley. 1990).

Data Collection Procedures

This section describes the procedures used in this study and is organized in chronological fashion.

Pretest. The pretest was administered to ACSC students within two weeks of their arrival at ACSC. Students had just finished an orientation course (not graded) which introduced them to ACSC's electronic environment, fellow students, school leadership, and administrative procedures. As a part of ACSC's curriculum, this orientation course (as with all ACSC courses) was voluntarily critiqued at the course's end. Critiques are submitted electronically: students log into the ACSC network and pull-up an on-line critique form. Included in the orientation course critique was the pretest for this study. Critiques were accepted for one week. The benefits of this approach were administrative in nature since results were easily tabulated and transferable to SPSS in electronic form.

Posttest. Seven months after the pretest, the posttest was administered. This researcher personally visited ACSC's individual seminars to describe the instrument, its purposes, and data confidentiality, and to answer questions. Seminar leaders (usually the senior ranking students) were asked to collect surveys and deposit them in a convenient location at their leisure.

MBTI, Career Orientation, and Performance Data. Near the end of the ACSC academic year, MBTI results were gathered from the contractor responsible for the administration, consolidation, and interpretation of those data. Although these results were available early in the academic year, written consent for release was required. Such consent was solicited on the posttest under an additional section for demographic data. After providing the contractor evidence of written consent for each consenting student, the first two letters of the four-letter MBTI were provided.

For the career orientation independent variable (aircrew or nonaircrew), data were collected through the demographic section of the posttest. Student comments were also available through the posttest. The dependent variables, academic and leadership performance, were not available until ACSC graduation in June, 1999. Soon after that

date, both academic GPA and the leadership performance scores (LPS) were gathered from ACSC's evaluation branch .

Analysis of Data

A master SPSS data file was created to contain all data except for student comments. For the SPSS analyses, each case number had the following independent variables: Myers-Briggs data (either EN, ES, IN, or IS), career orientation data (either aircrew or nonaircrew), stated learning preferences on the 12-item pretest (Likert scale, 1 through 7), a pretest cumulative learning preference index (ranging from 12 to 84), stated learning preferences on the 12-item posttest (Likert scale, 1 through 7), a posttest cumulative learning preference index (ranging from 12 to 84), and a learning preferences change index which is the difference between the pre and posttest cumulative indices.

Dependent variables were also recorded on the master data file. Each case number had a score for GPA (0.00 to 4.00) and leadership performance (LPS, ranging from 0.4 to 8.2). The consolidation of these data, both independent and dependent variables, permitted statistical analysis through the SPSS software package. Three major tests, with associated subtests, were performed to investigate the study's three hypotheses.

Hypothesis 1 stated that no statistically significant differences existed between the academic and leadership performance of students having different personality types, career backgrounds, and/or stated learning preferences, at or below the .05 level. Two multiple regressions were performed to determine the impact of the combination of all three independent variables on either the academic or leadership performance variable. Follow-up tests for each independent variable were also performed: one-way ANOVAs for both MBTI and stated learning preferences and a t-test for the career orientation independent variable. These follow-up tests looked only at the individual independent variable's impact on either the academic or leadership performance variable.

Hypothesis 2 stated that no statistically significant difference existed between student personality type and stated learning preferences, at or below the .05 level. A chi-square analysis was used to test this hypothesis. Students were categorized by MBTI and their overall preference for ACSC's methods in categorical (low, medium, and high) format. A significant finding would indicate that some personality types favored ACSC's methods.

Hypothesis 3 stated that no statistically significant difference exists between the stated learning preferences of students entering the ACSC curriculum and the same students after experiencing the ACSC curriculum, at or below the .05 level. This was tested using a one-way, repeated measures, within subjects ANOVA. If there was a significant finding (indicating that there was a significant change in learning preferences after experiencing the curriculum), then two subhypotheses were tested. The first subhypothesis was that no statistically significant difference exists between personality type and changes in stated learning preferences, at or below the .05 level. In this instance, a mixed model ANOVA was used with MBTI as the between-subjects factor and time (pretest/posttest) as the within-subjects factor. A significant finding required individual follow-up tests (again, repeated measures ANOVA) to see which MBTI combinations (EN, ES, IN, IS) significantly changed their preferences over the seven-month period. The second subhypothesis was that no statistically significant differences exists between changes in stated learning preferences and either academic or leadership performance, at the .05 level. This test was done to see if those whose preferences changed in favor of ACSC's methods performed better than those whose preferences remained the same or changed to dislike ACSC's methods. Two one-way ANOVAs, one for leadership and one for academic performance, were performed to test this hypothesis. The independent variable, change in learning preferences groups, was created by calculating the difference between an individual's pre and posttest score, then categorizing that person in one of

three groups: those whose preferences changed toward more dislike for ACSC's methods, those whose preferences stayed about the same, and those whose preferences changed toward more liking for ACSC's methods

The stated learning preferences survey provided an opportunity for students to comment on any aspect of the ACSC curriculum. These comments were read and categorized to identify those areas where students had most concern. To categorize the data, student comments were scrutinized to find general themes and trends, then consolidated into the various thematic categories. Such a qualitative approach, albeit a small portion of this research, was included to possibly help explain quantitative findings or to provide additional insights into ACSC's curriculum.

IV

RESULTS

This chapter records the results of the methods and various statistical tests generally described in chapter III. First, the stated learning preferences survey is described in terms of instrument development, administration, and reliability. After that, each of the three hypotheses are investigated along with associated subtests. All eight research questions will be answered during this portion. Finally, student comments from the stated learning preferences survey are consolidated to isolate general trends.

Instrument Development, Administration, and Reliability

Instrument development as well as measures to assure instrument validity and reliability were described in chapter III. This section narrates the actual development of the learning preferences survey, administration procedures, and the results of reliability testing.

Instrument Development

A draft survey consisting of ten items was sent to four experts in ACSC's curriculum, educational philosophies, and academic processes. These experts were chosen due to their familiarity with the ACSC curriculum, their position at the college, and their credentials in academic work (see Appendix G). Their product, Appendix H, was assembled by this researcher after gathering the panel's comments, edits, and concerns. It was then felt that the instrument captured the essence of ACSC's teaching methodologies and therefore would serve as the foundation for the survey meant to measure student preferences for ACSC's methods.

Pilot Study. The pilot study involving ACSC's first 50 students (see chapter III) was conducted using the panel-edited version of the survey to refine the instrument. Results were scrutinized to refine questions. Interestingly, comments were sometimes dichotomous; for example, while some students thought the survey was fine, others thought the survey was biased, leading students to accept ACSC's methods. Other students expressed dislike for a Likert scale without a neutral response, some did not like several of the survey's phrasings like "build personal meaning," and a few pointed out questions that appeared to query two concepts instead of one. Finally, some students took this survey as an opportunity to comment on personal learning preferences and perceptions about ACSC although instruction had not yet begun.

Because of these comments, most questions were rewritten to add clarity and precision; however, the original expert panel's comments overarched final editing decisions to maintain content validity. The survey was expanded to twelve questions instead of ten to assist in removing multiple concepts in individual questions. Further, to increase construct neutrality, a seven-response Likert scale was included and half of the questions were completely reworded so that negative responses (strongly disagree, disagree, and slightly disagree) actually favored ACSC methods. What this meant was that favorable responses for even numbered questions and unfavorable responses for odd numbered questions indicated preferences for ACSC's methods. It was hoped that this would reduce the bias or response-leading cited by students in the pilot study.

The Final Instrument. In Appendix I is the final survey used in the pretest for students new to ACSC as well as the first 50 students. This version included all changes discussed above. Because the survey was administered in an electronic format (described later), aesthetics were not important. Instead, an electronic file was provided to the ACSC computer network expert and then incorporated in a larger electronic survey distributed to all ACSC students at the beginning of the academic year.

The posttest version, Appendix J, was different aesthetically and included some items not in the pretest. These additional items were not germane to identifying student learning preferences--the learning preference portion remained exactly as it was in the pretest. The new items were included for reasons explained in the next section, and, because the posttest was administered in standard paper format, aesthetics became more critical.

Instrument Administration

Pretest procedures were followed as described in chapter III; however, the impersonal character of this electronic process as well as the voluntary nature of the overall orientation course critique resulted in a low ($n = 124$) response rate. Although those data are usable, this researcher sought another means for administering the posttest which was scheduled to occur seven months later. A higher response rate for the posttest would increase statistical confidence for those analyses using only posttest data. It was also discovered that Myers-Briggs data, a critical variable to this study's purposes, were not available without the written consent of students. According to the contractor who administered the Myers-Briggs test, written signature was required before any individual's data would be released.

Posttest Administration. With these considerations in mind, a new instrument was devised with the intent of personally administering it to each of ACSC's 44 seminars. The posttest instrument, Appendix J, included the exact questions used on the pretest as well as some demographic data like name, student number, seminar, occupational data, service affiliation, first two of the MBTI, and signature to allow use of MBTI for those not remembering their indicators. Much of these data could have been obtained through ACSC's personnel division, but, since written consent for MBTI data was necessary, this researcher though it prudent to gather as much data as possible in a single attempt.

Students were advised by the ACSC Dean of Students, Colonel James Norris, that the posttest (Appendix K) would be administered. It was subsequently given personally to 43 of ACSC's 44 seminars. One seminar was missed due to scheduling conflicts. Although tedious, this method provided intimate contact with each subject and allowed for full explanation of the study's purpose, data confidentiality, the need for written consent, and the requirement for follow-up testing to the pretest. The voluntary nature of the survey was emphasized, and there was also a question and answer period. Each seminar's student leader was asked to gather surveys and drop them, either completed or not completed, at a convenient location within the college. This method substantially increased response rate, $n = 306$, to about 79%.

Response Rate. The total response rate for the pretest was 124 students. This figure included all United States Air Force, international, and sister service officers. Using responses from only US Air Force officers who also took the posttest narrowed the response rate to 73 students which accounted for about 19% of sought respondents. Of those 73, one student did not fully complete the posttest; however, his pretest response was still usable for reliability analysis,

For the posttest, 306 students responded or about 79% of sought respondents. Of these, three respondents did not answer all survey questions and were therefore removed from the analysis. Also, two respondents did not have a Myers-Briggs score; therefore, these responses were also removed from analysis except for reliability procedures. Overall, to investigate this study's hypotheses, the sample size was $n = 301$ except in any analysis involving the pretest; in this instance, $n = 72$. Notably, before beginning analysis of either the pre or posttest responses, scores for odd-numbered questions had to be reversed (1 for 7, 2 for 6, and so on) since these items indicated dislike for ACSC's methods while the even items were keyed toward an appreciation for ACSC's methods.

Instrument Reliability

To measure the degree to which individual item scores agreed with one another, coefficient alpha procedures as described in Green, Salkind, and Akey (1997) were used. This measure ranges between 0 and 1, with values near 0 indicating poor reliability and values near 1 revealing superb reliability. Sprinthall (1994) notes that reliability reports vary depending on the nature of the instrument. Ability and aptitude measures generally exhibit scores near .90, attitude oriented measures are in the .80 range, and "[s]ome of the objective personality tests have lower reliabilities, some reportedly as low as .60" (p. 228).

Coefficient alpha results for this study's survey instrument were .6765 and .7679 for the pretest and posttest respectively. These scores are acceptable considering the objective nature of the instrument. Additional analysis was performed to improve coefficient alpha by investigating the various alphas produced if some survey items were removed. This was done using the SPSS item analysis procedure described in Green et al. (1997). Results were negligible; therefore, this researcher decided to continue analysis using all 12 items in both the pretest and posttest.

Investigation of Hypotheses

Data collected from the various sources were scrutinized to reveal the general nature of the data set. For the dependent variables GPA and LPS, pertinent descriptive data are given at Table 3. For the independent variables career background and MBTI, frequency statistics are depicted at Table 4.

Table 3

Descriptive Statistics for Dependent Variables

Variable	Min	Max	Mean	SD	n
GPA	2.77	4.00	3.6970	.1716	301
LPS	1.90	5.90	3.1016	.9177	301

Table 4

Frequency Statistics for Career Background and MBTI Independent Variables

Variable	Classification	n
Career Background	Aircrew	138
	Nonaircrew	163
MBTI	EN	68
	ES	93
	IN	52
	IS	88

For the stated learning preferences independent variable, Table 5 shows three different subvariables: first are pretest preferences for ACSC's methods, second are posttest preferences for ACSC's methods, and finally are the differences (delta) between pre and posttest scores. For the pretest and posttest subvariables, comparative categories were created to identify those whose preferences least favored ACSC's methods (Low), those whose preferences were neutral to ACSC's methods (Neutral), and those whose preferences most favored ACSC's methods (High). To derive these groupings, cases were assigned based on which third of the preference's spectrum they occupied. For example, about 33 1/3% of those cases with the lowest learning preference index score (the sum of all responses to the learning preferences survey) were assigned to the group least preferring ACSC's methods. This grouping was used to assure somewhat equal group sizes although exactly one-third grouping was not possible due to the dispersion of survey results. The range of index scores each classification encompassed is also provided in Table 5.

Table 5

Statistics for Learning Preferences Independent Variables

Subvariable	Classification	n	Index Range
Pretest Learning Preferences	Low	21	22 to 42
	Neutral	26	43 to 48
	High	25	49 to 64
Total		72	22 to 64
Posttest Learning Preferences	Low	94	20 to 47
	Neutral	103	48 to 56
	High	104	57 to 79
Total		301	20 to 79
Learning Preferences Delta	Negative	12	-26 to -8
	Neutral	28	-7 to 7
	Positive	32	8 to 47
Total		72	-26 to 47

Also in Table 5 is the Learning Preferences Delta ($M = 6.153$, $SD = 15.100$), a subvariable that groups cases by their change in learning preferences. A negative classification describes individuals whose preferences for ACSC's methods changed toward disfavor over the seven-month period. A neutral classification indicates a relatively minor change while a positive classification indicates a change toward favoring ACSC's methods. Classifications were delineated based on the standard deviation and 12-item survey; it was felt that a -7 or 7 numerical change represented a decided change in preference.

Hypothesis Number 1

No statistically significant differences exist between the academic and leadership performance of students having different personality types, career backgrounds, and/or stated learning preferences, tested at or below the .05 level. Research questions tested:

1. After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by the combination of personality type, career background, and stated learning preferences?
2. After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by personality type?
3. After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by career background?
4 After experiencing the ACSC curriculum, was there a statistically significant difference in student academic and leadership performance by stated learning preference?

To test this hypothesis and associated research questions two multiple regressions, one for each dependent variable (GPA and LPS) had to be conducted. Also, for each regression, appropriate follow-up tests were performed. In all instances, the sample size was $n = 301$.

GPA Multiple Regression

Answering part of the first research question, results for the regression model combining all three independent variables for the GPA independent variable were significant, $F(3,297) = 5.031$, $p = .002^{*}$, adjusted $R^2 = .039$. Table 6 provides model variables. To determine which combination of independent variables is most likely to predict higher GPA, each independent variable was analyzed within the context of the overall regression model. Because all t-tests depicted in Table 6 were significant, each independent variable must be scrutinized.

Table 6

Regression Model Summary for GPA

Variable	Beta	t	Sig	Part
Career Background	-.159	-2.787	.006*	-.158
Postlearning Preferences Index	-.116	-1.996	.047*	-.113
MBTI	.149	2.559	.011*	.145

Note: * implies significant at or below the .05 level.

For career background, those in aircrew status had a higher mean GPA (M = 3.7234, SD = .1687, n = 138) than nonaircrew (M = 3.6746, SD = .1713, n = 163). For scores on the posttest learning preferences index, the negative Beta value in Table 6 indicates that those students with comparatively less preference for ACSC's methods performed better. Finally, to understand the effect of MBTI on the model's significant finding, follow-up pairwise Tukey comparisons were necessary. The mean difference Tukey value for pairwise significant findings was calculated at .02286, $Q_k(4,297) = 3.63$, using weighted means to accommodate unequal sample sizes. Comparing this value with the difference between individual MBTI classification means (Table 7) allows comparison as depicted at Table 8.

Table 7

MBTI Mean GPA Scores

MBTI	Mean	SD	n
EN	3.6987	.1596	68
ES	3.6890	.1640	93
IN	3.7360	.1811	52
IS	3.6810	.1817	88

Table 8

Tukey Mean Difference Summary Table for GPA

Comparison	Mean Difference (Absolute Value)	Significant
IN vs EN	.0373	Yes
IN vs ES	.0470	Yes
IN vs IS	.0550	Yes
IS vs EN	.0177	No
IS vs ES	.0080	No
EN vs ES	.0097	No

Note: Significant findings are those which exceed the calculated Tukey value of .02286.

GPA Multiple Regression Conclusions. These results show that a student who has attended ACSC for seven months would be statistically significantly more likely to have a higher GPA if that individual possessed a certain combination of this study's independent variables. This statement is caveated by a weak adjusted R^2 which increases the likelihood of Type I error. The independent variable classifications most influencing a higher predicted GPA are aircrew career background, comparatively less favorable preference for ACSC's methods, and the IN Myers-Briggs Personality Type Indicator.

GPA Individual Independent Variable Analysis

For the GPA portion of the second, third, and fourth research questions, individual analysis of each independent variable was conducted. Table 9 summarizes the results of this investigation.

GPA Individual Independent Variable Conclusions. Considering each independent variable separately, only those with an aircrew career background statistically significantly performed better than nonaircrew. However, this is caveated by the weak effect size of .0202, increasing the likelihood of Type I error. Neither the post learning preference index

Table 9

GPA Individual Independent Variable Analysis

Variable	Test Statistic	Sig	Effect Size	Levene's Test for Equal Variances
Career Background	t(299) = 2.480	.014*	.0202	F = 1.074; p = .301
Postlearning Pref	F(2,298) = 0.747	.475	.0050	F = 1.356; p = .259
MBTI	F(3,297) = 1.220	.303	.0120	F = 0.108; p = .956

Note: * implies significant at or below the .05 level.

nor the MBTI variable has a statistically significant effect on student GPA.

LPS Multiple Regression

Answering the second part of the first research question, results for the regression model combining all three independent variables for the LPS independent variable were significant, $F(3,297) = 5.689$, $p < .001^*$; adjusted $R^2 = .058$. Table 10 provides model variables.

Table 10

Regression Model Summary for LPS

Variable	Beta	t	Sig	Part
Career Background	-.229	-4.058	<.001*	-.227
Postlearning Preferences Index	.040	0.707	.480	.040
MBTI	.130	2.254	.025*	.126

Note: * implies significant at or below the .05 level.

To determine which combination of independent variables is most likely to predict higher LPS, each independent variable was analyzed within the context of the overall regression

model. Because only two t-tests depicted in Table 10 were significant, the independent variables associated with these significant findings were scrutinized.

For career background, those in aircrew status had a higher mean LPS ($\underline{M}$ = 3.3179, $\underline{SD}$ = .9687, $\underline{n}$ = 138) than nonaircrew ($\underline{M}$ = 2.9184, $\underline{SD}$ = .8321, $\underline{n}$ = 163). To understand the effect of MBTI on the model's significant finding, follow-up pairwise Tukey comparisons were necessary. The mean difference Tukey value for pairwise significant findings was calculated at .3827, $Q_k(4,297) = 3.63$, using weighted means to accommodate unequal sample sizes. Comparing this value with the difference between individual MBTI classification means (Table 11) allows comparison as depicted at Table 12.

Table 11

MBTI Mean LPS Scores

MBTI	Mean	SD	n
EN	3.2381	.9993	68
ES	3.1740	.9197	93
IN	3.2375	1.0099	52
IS	2.8392	.7361	88

LPS Multiple Regression Conclusions. These results show that a student who has attended ACSC for seven months would be statistically significantly more likely to have a higher LPS if that individual possessed a certain combination of this study's independent variables. This statement is moderately supported by an adjusted R^2 value of .058. The independent variable classifications most influencing a higher predicted LPS are aircrew career background and NOT possessing the IS Myers-Briggs Personality Type Indicator.

Table 12

Tukey Mean Difference Summary Table for LPS

Comparison	Mean Difference (Absolute Value)	Significant
IN vs EN	.0004	No
IN vs ES	.0635	No
IN vs IS	.3983	Yes
EN vs IS	.3989	Yes
ES vs IS	.3348	No
ES vs EN	.0641	No

Note: Significant findings are those which exceed the calculated Tukey value of .3827.

LPS Individual Independent Variable Analysis

For the LPS portion of the second, third, and fourth research questions, individual analysis of each independent variable was conducted. Table 13 summarizes the results of this investigation. Because the MBTI analysis in Table 13 showed problems with equality of variances, SPSS was used to conduct follow-up comparisons using Dunnett C. In this analysis, only the EN vs IS and the ES vs IS comparisons were found significant.

LPS Individual Independent Variable Conclusions. Considering each independent variable separately, an aircrew career background statistically significantly performed better than nonaircrew in the leadership performance score dependent variable. The effect size of .0472 moderately supports this conclusion. Also, the MBTI grouping was significant, supported weakly, however, by an effect size of 0.0350. For this independent variable, the IS group performed statistically significantly poorer than the ES and EN groups.

Table 13

LPS Individual Independent Variable Analysis

Variable	Test Statistic	Sig	Effect Size	Levene's Test for Equal Variances
Career Background	t(299) = 3.849	<.000*	.0472	F = 3.620; p = .058
Postlearning Pref	F(2,298) = 2.722	.067	.0180	F = 2.480; p = .085
MBTI	F(3,297) = 3.561	.015*	.0350	F = 3.756; p = .011

Note: * implies significant at or below the .05 level.

Hypothesis Number 1 Summary

The various tests used to investigate the first hypothesis showed the following:

1) For the combination of the three independent variables in relation to GPA, the null hypothesis was rejected.

2) For the career background independent variable in relation to GPA, the null hypothesis was rejected.

3) For the postlearning preferences independent variable in relation to GPA, this study failed to reject the null hypothesis.

4) For the MBTI independent variable in relation to GPA, this study failed to reject the null hypothesis.

5) For the combination of the three independent variables in relation to LPS, the null hypothesis was rejected.

6) For the career background independent variable in relation to LPS, the null hypothesis was rejected.

7) For the postlearning preferences independent variable in relation to LPS, this study failed to reject the null hypothesis.

8) For the MBTI independent variable in relation to LPS, the null hypothesis was rejected.

Hypothesis Number 2

No statistically significant difference exists between student personality type and stated learning preferences, tested at or below the .05 level. Research question tested: among ACSC's students, was there a statistically significant correlation between stated learning preference and personality type?

To test this hypothesis, a two-way (4X3) contingency table analysis was conducted to investigate whether Myers-Briggs classifications were related to stated learning preferences. The sample size under scrutiny was $n = 301$.

MBTI and Stated Learning Preferences Chi-Square Analysis

Table 14 reports crosstabulations for subject analysis. MBTI and stated learning preferences were significantly related (Pearson χ^2 (6, $N = 301$) = 38.979, $p<.001^*$, Cramer's $V = .254$, Contingency Coefficient = .339). Follow-up pairwise comparisons (Table 15) evaluated the differences among the various MBTI groupings. Control for Type I error used the Holm's sequential Bonferroni method across all six comparisons.

Conclusions for MBTI and Stated Learning Preferences Relationship. The relationship between Myers-Briggs Personality Type indicator and posttest stated learning preferences was significant with moderate strength of effect support from the Cramer's V value of .254. For pairwise comparisons, every combination analyzing the N personality type with the S type was significant. This, in combination with Table 14, reveals that after seven months exposure to the ACSC curriculum, N types tend to prefer ACSC's methods and S types tend not to prefer ACSC's methods. Therefore, for the second hypothesis, this study rejected the null hypothesis.

Hypothesis Number 3

No statistically significant difference exists between the stated learning preferences of students entering the ACSC curriculum and the same students after experiencing the ACSC curriculum, tested at or below the .05 level. Subhypothesis: If learning preferences

Table 14

Crosstabulations for MBTI and Stated Learning Preferences

			Preferences for ACSC's Methods		
			Low	**Medium**	**High**
MBTI	EN	Actual	11	18	39
		Expected	21	23	24
	ES	Actual	34	39	20
		Expected	29	32	32
	IN	Actual	12	13	27
		Expected	16	18	18
	IS	Actual	37	33	18
		Expected	28	30	30

Table 15

MBTI and Stated Learning Preferences Follow-Up Pairwise Comparisons

Comparison	**Pearson chi-sq**	**p**	**Required p for Sig**	**Decision**	**Cramer's V**	**Contin Coeff**
EN vs IS	24.063	<.001*	.0083	Sig	.393	.366
EN vs ES	22.266	<.001*	.0100	Sig	.372	.349
IN vs IS	14.984	.001*	.0125	Sig	.327	.311
IN vs ES	14.098	.001*	.0167	Sig	.312	.298
EN vs IN	0.915	.633	.0250	Not Sig	.087	.087
ES vs IS	0.594	.743	.0500	Not Sig	.057	.057

Note: * implies significant at or below the .05 level.

change, no statistically significant difference exists between personality type and changes in stated learning preferences, tested at or below the .05 level. Subhypothesis: If learning preferences change, no statistically significant differences exist between changes in stated learning preferences and either academic or leadership performance, tested at the .05 level.

Research questions:

1. After experiencing the ACSC curriculum, did individual learning preferences change to a statistically significant degree?
2. If individual learning preferences changed after experiencing the ACSC curriculum, was there a statistically significant correlation with personality type?
3. If individual learning preferences changed after experiencing the ACSC curriculum, did changes statistically significantly correlate with academic and leadership performance?

To test these hypotheses a number of tests were conducted. To determine if individual learning preferences change, a one-way, repeated measures within subjects ANOVA was conducted. To analyze the relationship between personality type and changes in stated learning preferences, a mixed model ANOVA was conducted with MBTI as the between subjects factor and time (pretest vs posttest) as the within subjects factor. Follow-up tests to explore the individual MBTI changes were necessary to investigate a significant interaction effect. Here one-way, repeated measures ANOVAs were conducted at the simple effects level. In these follow-up tests, error control and evaluation of the effects of the individual personality type indicators with respect to the omnibus test was achieved by using the overall model error term to compute individual F values. Finally, to test the relationship between changes in learning preferences and both GPA and LPS, one-way ANOVA calculations were used. The independent variable, change in learning preferences grouping, was created by classifying individuals into one of three groups: those whose preferences changed toward less favor for ACSC's methods,

those whose preferences for ACSC's methods stayed about the same, and those whose preferences changed to more favor ACSC's methods. In all tests $\underline{n} = 72$.

The Relationship Between Stated Learning Preferences on Pre and Posttests

With a possible range of scores between 7, for extremely low preferences, and 84, for extremely high preferences, the pretest mean was $\underline{M} = 45.236$, $\underline{SD} = 7.955$, and, for the post test, $\underline{M} = 51.389$, $\underline{SD} = 9.086$. The one-way, within subjects ANOVA to determine the relationship between stated learning preferences on the pre and posttest was significant, Wilks' $\Lambda = .856$, $F(1,71) = 11.954$, $p = .001^{*}$, $\eta^2 = .144$.

Conclusion About the Pre/Posttest Stated Learning Preferences Analysis. Individuals taking the pretest then, seven months later, taking the post test, statistically significantly increased their preferences for ACSC's methods. This conclusion is strongly supported by an effect size of .144.

The Relationship Between Changes in Learning Preferences and MBTI

Table 16 depicts the individual means for each MBTI on both the pre and posttest. These descriptives are also pictured graphically at Figure 2. Results of the mixed model omnibus ANOVA are provided at Table 17. Follow-up testing of the omnibus for individual MBTI analysis (to investigate which MBTI had significant changes in preferences) is reported in Table 18.

Conclusion About the Relationship Between Changes in Learning Preferences and MBTI. Individuals with different Myers-Briggs Type Indicators who took the pretest, then, seven months later, took the post test, statistically significantly differed in their changes in preferences for ACSC's methods. The EN and IN types statistically significantly changed their preferences while neither the ES or IS did to a statistically significant degree. There are strong to moderate effect sizes to support these conclusions.

Table 16

Pre and Posttest Preferences Means by MBTI

MBTI	n	Time	Mean
EN	12	Pre	40.833
		Post	56.417
ES	26	Pre	46.654
		Post	49.923
IN	12	Pre	43.833
		Post	53.667
IS	22	Pre	46.727
		Post	49.136

Figure 2: Changes in pre/posttest means by individual MBTI

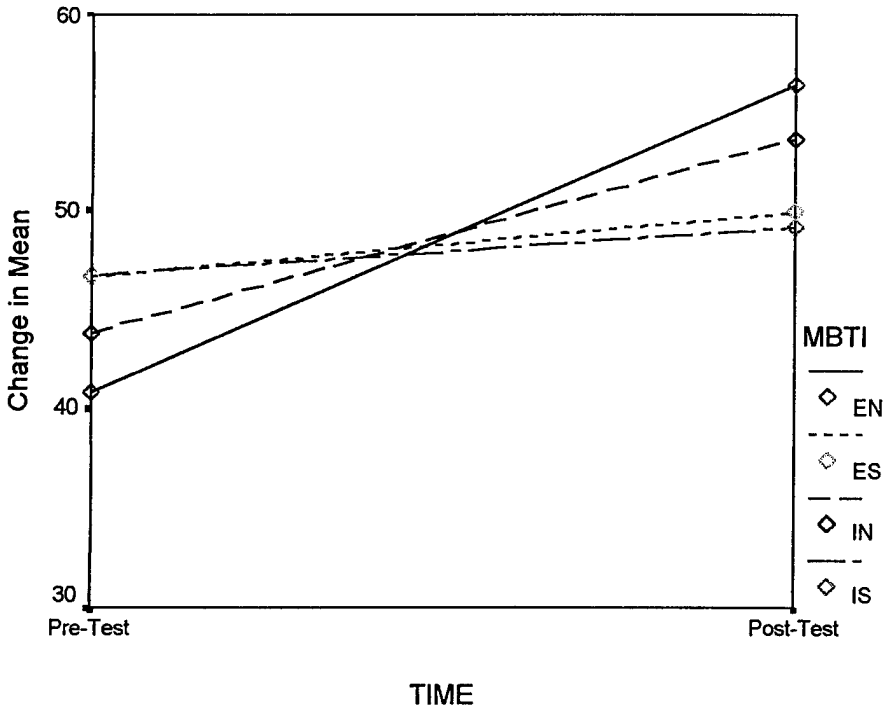


Table 17

Mixed Model ANOVA: Changes in Learning Preferences with Regard to MBTI

	df	MS	F	Sig	Effect Size
Between Subjects					
MBTI	3	4.448	0.135	.939	.006
Error	68	33.031			
Within Subjects					
Time	1	1929.299	18.177	<.001*	.211
Time X MBTI	3	292.384	2.755	.049*	.108
Error	68	106.140			

Table 18

Individual MBTI Analysis for Changes in Learning Preferences

MBTI	df	MS	F	$F_{0.05}$	η^2	Conclusion
EN	1	1457.042	13.73	4.00	.466	Sig
ES	1	138.942	1.31	4.00	.077	Not Sig
IN	1	580.107	5.46	4.00	.380	Sig
IS	1	63.841	0.60	4.00	.021	Not Sig
MS_{error}	68	106.140				

The Relationship Between Changes in Learning Preferences and both GPA and LPS

Table 19 provides descriptives showing means and standard deviations for negative, neutral, and positive change groups regarding both the GPA and LPS dependent

Table 19

GPA and LPS Means and Standard Deviations for Preference Change Groups

Variable	Group	Mean	SD	n
GPA	Negative Change	3.7692	0.0963	12
	Neutral Change	3.6157	0.2337	28
	Positive Change	3.7537	0.1565	32
LPS	Negative Change	3.2500	0.8624	12
	Neutral Change	3.0275	1.0557	28
	Positive Change	3.4697	0.8543	32

variables. One-way, between subjects ANOVA tests showed that for GPA, the test was significant, $F(2,69) = 5.145$, $p = .008^*$, $\eta^2 = .130$, and for LPS, the test was not significant, $F(2,69) = 1.655$, $p = .199$, $\eta^2 = .046$. For the GPA test, Levene's test for equality of variance was significant, $F(2,69) = 3.343$, $p = .041^*$; therefore, subsequent multiple comparison analysis relied on Dunnett C which showed a statistically significant difference between the neutral and negative change groups as well as a statistically significant difference between the neutral and positive change groups. There was no statistically significant difference in GPA between the negative and positive change groups.

Conclusions About the Relationship Between Changes in Learning Preferences and both GPA and LPS. Over the seven-month period between the pretest and posttest, those students whose stated learning preferences changed to either more or less favor for ACSC's methods had statistically significantly higher GPAs than those whose preferences remained about the same. There was no statistically significant relationship between LPS and changes in preferences however. These conclusions are supported by moderate to strong effect sizes.

Hypothesis Number 3 Summary

The various statistical tests for the third hypothesis provide these conclusions:

1) For the hypothesis that no statistical difference exists between stated learning preferences of students entering the ACSC curriculum and the same students after experiencing the ACSC curriculum, the null hypothesis was rejected.

2) For the subhypothesis that no statistical difference exists between personality type and changes in stated learning preferences, the null hypothesis was rejected.

3) For the subhypothesis that no statistical difference exists between changes in stated learning preferences and either academic or leadership performance, the null hypothesis was rejected regarding academic performance. For leadership performance, this study failed to reject the null hypothesis.

Investigation of Student Comments

Students were given an opportunity to comment about anything related to the survey, the ACSC curriculum, or their learning preferences. These data were solicited to assist in explaining quantitative findings and to add insights not available through quantitative methods. This researcher was not certain about the nature of student comments before administering the survey, but felt it necessary to provide additional data should applicable findings emerge.

Although response was optional, 95 of the posttest's 301 respondents chose to provide written comment. Table 20 depicts the respondents in terms of MBTI and career background. Expected responses are weighted based on the overall dispersion of respondents on the posttest. Student comments are provided at Appendix L. Table 21 shows the general categories on which comments focused and the number of respondents addressing each concern. To create this table, individual student comments were broken into broad categories and tallied as to how many students addressed a specific category.

Table 20

Proportion of Individuals Providing Written Responses by MBTI and Career Background

Variable	Category	Actual Responses	Expected Responses
MBTI	EN	28	22
	ES	27	29
	IN	23	16
	IS	17	28
	Total	95	95
Career Background	Aircrew	33	44
	Nonaircrew	62	51
	Total	95	95

Table 21

General Categories of Student Comments

Category	Number of Students Commenting
Motivation as the Key to Student Performance	6
Collaborative Techniques	9
Distinguished Graduate Program	9
Critical Thinking	10
Quality of ACSC's Instructors	12
Use of Technology	16
Teaching Methods Dependent on Context	17
Student Evaluation	35

Notably, some students addressed more than one category. Any category with five or more responses, representing just over 5% of the individuals responding, was included in the table.

Discussion of Student Comments

The categories in Table 21 will be individually discussed in this section to provide a general idea of the nature of student's comments. Although students discussed other topics, these were the areas most frequently addressed. Most of these comments are negative, but this should be tempered with the realization that many chose not to respond and that this researcher purposely directed students' attention to the comments section when administrating the survey, perhaps creating an opportunity to vent any and all frustrations.

Motivation as the Key to Student Performance. Several students challenged this survey's purpose: "Why don't you ask us what motivates us? Are we trying to max learning or max grades?" Another responded, "[Y]ou need to look at motivation versus academic performance." These students believed that this study's analysis of personality type, career background, and stated learning preferences as related to academic and leadership performance was not the proper path. Instead, discovering student motivations to perform was essential, and some felt that the chief motivation was ACSC's "competitive environment" typified by ACSC's "grading, DG [Distinguished Graduate] program, Top Third program, Academic [sic] recognition program and the emphasis 'DG' has on promotion."

Collaborative Techniques. There was little criticism about the college's use of collaborative teaching techniques: "I have learned the most through the interchanges while working on projects with my classmates," confided one student. And, to another student, collaboration was the "[b]est part (most valuable) of ACSC." Interestingly, no comments disparaging group efforts, facilitatory learning, and seminar discussion were noted;

however, one student felt that seminar time was often wasted "listening to people trying to find something to talk about."

Distinguished Graduate Program. Several students included succinct statements regarding their opinion of the ACSC Distinguished Graduate program: "Get rid of the DG program!!" One student was more vocal: "Delete the 'Distinguished Graduate' program. It is counterproductive to promoting critical team building amongst field grade officers. It has been proven to be unhealthy competition and promote[s] juvenile interactions."

Critical Thinking. There was concern that ACSC did not meet its goal of fostering critical thinking, and this seemed to be tied to evaluation: "To instruct students to learn and think 'outside the box' and then grade 'inside the box' is a great injustice to those who try to follow the guidance," stated one student. Another agreed, "We've been told in the past 'we want to hear your ideas' yet test grades seem to suffer if those ideas are beyond some narrow boundaries." Finally, one student remarked, "Critical thinking!! I have not gotten past the first two tiers (know, understand) of learning... there is no analysis, synthesis involved."

Quality of ACSC's Instructors. As noted in an earlier chapter, the quality of ACSC's instructors has been cited as a problem in some instances. A student relayed that "[t]he ACSC curriculum is great if and when the seminar instructors are competent and credible." Another noted that course instructors (CI) are sometimes very good, but "there are times when CI's seem to be the lowest common denominator and the learning is diminished. Others have been great--but far fewer." Criticisms regarding expertise, credibility, poor teaching and evaluation ability were noted. Again, however, this was cited as a problem in some, but not all, instances.

Use of Technology. Those who addressed ACSC's technology expressed dislike for some portions and viewed it more as a curriculum tool than an innovative instructional methodology. One student remarked that "ACSC does not use technology in any

meaningful unique or novel way." There was agreement as to technology's utility, especially for electronic mail and assignment completion; however, several complained that the issued laptop computer had insufficient capabilities to allow remote log-on. Several also complained that assigned readings should not be provided on the computer network since they are hard to read and require printing for quality study. Notably, only a few of ACSC's assigned readings are dispersed in this manner.

Teaching Methods Dependent on Context. Several students commented on the need for a variety of teaching methods even if a particular method was not their preferred mode of delivery. Most felt that teaching methods should be contextually derived; that methods should be derived based on what is taught, who is teaching, and level of difficulty. One student explained, "[J]ust because people 'prefer' learning in an older, lecture-style format, it doesn't mean they'll learn more effectively that way. It's good to 'stretch' people's learning style although to focus... any curriculum exclusively on any 1 [sic] method of teaching is off-target." Another student added, "I prefer the group discussion/interaction method of learning. However, which method I really desire depends on the instructor and format of the test and/or how we are being graded and what's expected." This comment is especially telling in light of the next section.

Student Evaluation. ACSC's evaluation techniques solicited by far the most responses and this is traceable to prior comments about ACSC's methods, student motivation to perform, and the college's competitive environment. The majority felt that ACSC's philosophical theme of critical thinking was betrayed by its examinations. "Due to the nature of the examinations, our class decided that there are ACSC acceptable/right answers--thinking out of the box is not encouraged or praised," stated one student. Another commented that "It was tough for me to 'succeed' in essays that expected regurgitation versus thought/application."

One student noted that exams were "more a grammar and typing exercise than an evaluation of student knowledge. Students with outstanding typing and writing skills have an advantage." Finally, tying the idea of student evaluation to teaching methods, a student (EN, Aircrew, 3.95 GPA, and 4.24 LPS), remarked about the stated learning preference survey as a whole:

> These questions all need an "it depends" answer. The ACSC measurement devices positively crush self synthesis, opinion, and deeper levels of learning. To succeed in ACSC, you have to learn how and what to regurgitate. With this in mind, most of my answers would shift toward [a] structured, instructor-led, force-feed environment, instead of my normal seminar style, forum/debate type environment that I have indicated in this survey.

Positive Comments. While the general nature of comments was criticism, several students did remark positively about ACSC's curriculum. One student asserted, "I learned ALOT here--I appreciate your study's efforts." Another stated that "I believe ACSC does it about right. Testing does a good job of determining who understands the material and who does not." Finally, regarding ACSC's teaching techniques, a student remarked, "I like balance!!! Difficult subjects require different techniques. Overall ACSC does a good job."

Conclusions About Student Comments

Although covering a variety of topics, the negative comments regarding ACSC's curriculum and individual learning preferences focused on a set of interrelated issues chiefly motivated by the school's competitive environment. Displeasure with the evaluation program, the DG program, and the school's perceived inability to foster critical thought seemed tied to student desire and motivation to do well at the school, and, subsequently, improve their military records and chances for promotion. In addition, preferred teaching methods and instructional quality were also linked to evaluation;

several students wanted to be taught in a manner that focused on the examination while others questioned some instructors' ability to impart instruction and evaluate exams in a credible manner. Finally, there were positive comments which generally stated that ACSC's methodology had the appropriate mix of methods.

V

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER STUDY

This final chapter discusses the findings reported in chapter IV, describes implications of those findings, and recommends possible avenues for future study. It begins with an overview of the research and follows with an analysis of the limitations forwarded in the first chapter. Following that is a short synopsis of the design, development, and reliability of the learning preferences survey. A large section of this chapter discusses the various hypotheses and provides an analysis of student comments. Finally, some overall conclusions are presented.

Study Overview

This study investigated the possibility that identifiable groups of students might thrive in a specified educational environment while others might not. The students, all United States Air Force Officers, were categorized by career orientation, personality type, and stated learning preferences. The study was conducted while these officers were immersed in a ten-month curriculum at the United States Air Command and Staff College (ACSC) located in Montgomery, Alabama.

ACSC's curriculum is systematically grounded (Hannafin et al., 1997) in a constructivist learning philosophy, an essentialist educational conception, and a practical curriculum platform. These ideas are well-founded and have ample research discussing their merits. However, to this researcher, once a student and later a faculty member at ACSC, the curriculum seemed to lack an individualized approach. The concept of

individual differences did not appear in any of ACSC's curricula like lesson plans, syllabi, or similar documentation.

The notion that students learn better when methods match preferences is not new, yet, as the literature review (chapter II) points out, it was during the 1970s and 1980s that the idea of catering to individual learning preferences actually took hold. The work of Kolb (Kolb, Rubin, & McIntyre, 1971; cited in Jonassen & Grabowski, 1993), Dunn and Dunn (1975), Hill (1976; cited in Jonassen & Grabowski, 1993), and Keefe (1988), among others, demonstrated the importance of addressing individual learner styles in the classroom. However, as the literature review also showed, other research into adult learning preferences has yielded mixed results.

Given that ACSC used a grounded approach and did not cater to individual learning preferences, this researcher hypothesized that some groups of students--identifiable by career orientation, personality type, and stated learning preferences--would perform better since their traits (whether the combination of these traits or individually) would better accommodate ACSC's methods. It was also hypothesized that certain personality types would have identifiable and distinct learning preferences. Finally, it was hypothesized that some individuals would change their learning preferences after experiencing the ACSC curriculum and this would, in turn, lead to better performance.

The independent variables were delineated as follows: career orientation in terms of aircrew and nonaircrew officers; personality type in terms of the Myers-Briggs Personality Type Indicator groupings of EN, ES, IN, IS; and stated learning preferences in terms of those most favoring ACSC's methods, those least favoring ACSC's methods, and those comparatively indifferent to ACSC's methods. The dependent variables were final GPA and final Leadership Performance Score (LPS).

Contributions resulting from this study are many and varied. Most important to this researcher is the impact these findings will have upon the Air Command and Staff College, the nation's only school educating midcareer military officers in the art and science of combined and joint air operations. This research also provides ACSC with a unique learning preferences survey that has endured both validity and reliability scrutiny.

This research also contributes to the study of adult learning preferences and both reinforces and contradicts the findings of earlier studies. Also, no other study found by this researcher actually investigated changes in learning preferences and its correlation to personality type as well as student performance. Finally, the Myers-Briggs Personality Type Indicator (MBTI) is a popular and powerful assessment tool; however, this researcher found no studies of the nature conducted in this analysis regarding the linkage of MBTI to a constructivist, essentialist, practical curriculum; changes in learning preferences correlated with MBTI; and the relationship of type-theory to leadership performance.

Instrument Development, Administration, and Reliability

To measure student learning preferences a survey unique to ACSC was devised that specifically determined the degree to which students liked or disliked ACSC's teaching methods. The instrument was validated by a panel of experts whose comments assisted in formulating the 12-item instrument. In addition, a pilot study was conducted involving the first 50 students entering ACSC, and this helped refine the instrument, making it more readable, clear, and straightforward during actual implementation.

This researcher attempted to use the college's technology devices to administer the survey through the school's network. Although convenient, time saving, and perhaps innovative, the response rate, albeit usable, was lower than expected. Therefore, personal administration of the posttest was sought. It was also discovered that MBTI data required written consent for release by each participant. Hence, a demographic section was added

to the posttest to gather MBTI data, consent to use MBTI, and career orientation. When personally administered to 43 of ACSC's small seminars, response rate substantially increased, as did the burden on this researcher to administer the survey, consolidate data, and create data files.

Before actually using survey results, reliability testing was necessary to determine the instrument's consistency. Poor reliability would indicate inadequate instrument design and render data useless; however, this instrument's coefficient alpha reliability was .6765 and .7679 for the pre and posttest respectively. These scores are sufficient especially considering the nature of the instrument--as an attitude or preferences oriented measure, scores as low as .6000 are not unusual (Sprinthall, 1994).

Investigation of the Hypotheses

After eliminating cases with bad or missing data, the sample size $n = 301$ was used for all analyses except those involving the pretest. For the pretest analyses, $n = 72$. Descriptive statistics for the three independent and two dependent variables are provided at Tables 3, 4, and 5 in chapter IV. About 46% of the officers were aircrew, 54% were nonaircrew. For MBTI categories, 22.6% were EN, 30.9% were ES, 17.3% were IN, and 29.2% were IS.

Scores on the learning preferences survey could range from 7 (least preference for ACSC's methods) to 84 (most preference). On the pretest, $M = 45.236$, $SD = 7.955$ and on the posttest, $M = 51.389$ and $SD = 9.086$ for those who also took the pretest. Regarding changes in learning preferences, 16.7% changed their preferences toward disfavor, 44.4% changed their preferences toward favoring, and 38.9% indicated relatively minor changes in their preferences for ACSC's methods.

The three hypotheses in this study required an assortment of statistical tests. The first hypothesis analyzed student performance in light of the three independent variables combined and separately. Further, because there were two dependent variables, analysis

was doubled. Multiple regressions were conducted to assess the impact of the three independent variables on each dependent variable, one-way ANOVAs were used to assess the impact that MBTI and stated learning preferences had on performance, and t-tests assessed the impact of career orientation on performance. The second hypothesis investigated the relationship between MBTI and stated learning preference. Here, a simple chi-square analysis was used. Finally, the last hypothesis analyzed changes in learning preferences by MBTI and in terms of performance. A total of eight separate one-way ANOVAs, one of mixed model design, were used in this analysis.

Hypothesis Number 1

The first hypothesis stated that no statistically significant differences exist between the academic and leadership performance of students having different personality types, career backgrounds, and/or stated learning preferences, tested at or below the .05 level. Analyzing this hypothesis involved several distinct analyses and was accomplished first for the academic (GPA) variable and second for the leadership (LPS) variable.

GPA Analysis. The multiple regression for the GPA analysis was conducted to determine if the three independent variables together accounted for significant performance differences. Results were significant; however, the weak effect size (R^2 = .039) casts suspicion on this overall conclusion. Thus, while a significant finding is notable, this must be caveated with the fact that only 3.9% of the variance in academic performance can be attributed to the influences of the three independent variables combined. Referring to Tables 6, 7, and 8 in chapter IV, the three variables which combine to most influence academic performance (those variables whose academic performance was superior) were the aircrew career background, individuals who least favored ACSC's methods, and the IN personality group.

Examining the three independent variables separately, only career background had a significant finding; however, again, a weak effect size (R^2 = .0202) limits the utility of

this finding. Regardless, academic performance favored the aircrew career background. For learning preferences and MBTI individually, this study failed to reject the null hypothesis, and this decision is supported by weak effect sizes of $R^2 = .0050$ and $R^2 = .0120$ respectively.

GPA Analysis Implications. The weak support for the statistical decision to reject the null hypothesis for the combination of all three independent variables leads one to speculate that other, more influential variables exist when examining the academic performance of adults. Further, the examination of the three independent variables individually showed that academic performance was not influenced by personality type and learning preferences although career background was minimally related to performance. This conclusion agrees with Korhonen and McCall (1986), who found no performance increases with regard to learning style using Kolb's instrument, and Prorak, Gottschalk, and Pollastro (1994), who also found no statistical differences in test scores when method and preferences were matched. In short, the conception that academic performance increases when catering to individual stated learning preferences or personality type (as measured by the ACSC learning preferences survey and the Myers-Briggs Personality Type Indicator respectively) is not well supported by this research.

This research did confirm Myers and McCalley's (1985) assertion that IN learners have the greatest potential in academic aptitude. This is displayed in Table 8 where IN types performed statistically significantly better than all other types in the context of the multiple regression model. This research also adds to Lawrence's (1995) in-depth investigation of the use of MBTI in academic environments; Lawrence does not cite studies regarding student performance. Finally, it is notable that significantly better performance was found for the aircrew career orientation (albeit, weakly supported by effect size). It could be asserted that ACSC's curriculum has a strong operational background; that is, the school emphasizes aerospace operations and the teaching of

warfighting skills, which favor those with an aircrew status. This was also contemplated by a student who noted, "I'm concerned for the non-operator who comes down here. The strong ops content, especially early on, has to put them behind the power curve."

Adult Academic Achievement: Recommendations for Further Study. This study's weak support for statistical findings in academic achievement calls for the need to investigate other independent variables which might better relate to academics. As noted in chapter IV, several students speculated that the key independent variable was motivation. Such a study--an analysis of what motivates students to do well--should look for incentives to perform. Commonly cited reasons to work diligently in academic pursuits could be examined in relationship with the same dependent variables of this study. Interestingly, as Table 1 in chapter II points out, The Dunn, Dunn, and Price Learning Style Model includes student motivation under the emotionality grouping. This instrument could be used with specific focus on emotionality.

Also, bearing in mind that these adults are in midcareer status, most with families and concerns outside of the academic environment, it might be beneficial to examine personal interests and outside influences which might impact achievement. As Knowles (1984) and Brookfield (1986) assert, adults have much influencing their ability or desire to learn; it may be worth investigating student interest in achievement versus academic performance. Thus, motivation and interest may be two independent variables that better explain adult academic achievement.

LPS Analysis. The multiple regression for the LPS analysis was conducted to determine if the three independent variables together accounted for significant leadership performance differences. Results were significant, and the effect size, $R^2 = .058$, moderately supports the decision to reject the null hypothesis. Tables 10, 11, and 12 indicate that further analysis of the regression model is possible. Two of the independent

variables indicated superior leadership performance: those with an aircrew career orientation and those who do not possess the IS MBTI.

Looking at the independent variables individually, test results for both the career orientation and MBTI independent variables were significant. Those with an aircrew career status scored statistically significantly better than nonaircrew with moderate effect size support, $R^2 = .0472$. For MBTI the IS grouping showed statistically significantly poor leadership performance compared to the EN and ES groups; however, the effect size, $R^2 = .0350$, weakly supports this finding.

LPS Analysis Implications. Stated learning preferences showed no impact on leadership performance; however, support by the analyses' effect sizes confirm the conclusion that aircrew students not possessing the IS MBTI generally perform better in leadership at the college. Again, regarding the aircrew orientation, a possible explaination is that the school's strong operational leanings favor the aircrew status. These individuals could more readily offer their expertise during group discussions and projects, thus improving the likelihood of higher instructor and peer leadership ratings.

Descriptions of the various MBTI types in chapter II possibly explain the IS MBTI type's poorer leadership performance. These individuals prefer individual and reflective activities, neat and orderly presentation of validated facts, and personal experiences. At ACSC, however, the environment in which leadership is assessed is generally collaborative with thought-provoking activities that examine possibilities, disordered data, and uncertain outcomes. While it should not be concluded that IS types have poor leadership abilities, it appears that IS types are not as visible as E types at ACSC, are not as comfortable with the ACSC environment as N types, and are therefore less likely to perform well under ACSC's leadership measurement system.

Leadership Performance: Recommendations for Further Studies. Leadership is an attribute envied yet sought in virtually every profession. While this study's analysis of

leadership has been comparatively minor, findings seem to support that leadership performance at ACSC is bolstered through subject matter expertise and an extroverted life orientation. A worthwhile study would examine the MBTI profile of recognized leaders by profession to determine whether certain professions value different types, whether there is a common type among the leaders of all professions, or if there is no relationship between type and leadership.

At ACSC, leadership is assessed through the subjective inputs of instructors, staff, and fellow students. It might be worthwhile to develop other measures of leadership performance like involvement in both military and civilian extracurricular activities, success in leadership oriented scenarios like wargames, and scores on leadership aptitude tests. Then, with the newly contrived leadership performance score, this study could be replicated.

Hypothesis Number 2

The second hypothesis stated that no statistically significant difference exists between student personality type and stated learning preferences, tested at or below the .05 level. The test was significant with moderate effect size indicating that personality type and stated preferences for ACSC's methods were related. See Tables 14 and 15. More in-depth analysis revealed that N types tended to prefer ACSC's methods and S types did not.

Implications. Table 14 is especially telling--indications are that N types had high preferences for ACSC's constructivist, essentialist, and practical curriculum platform while S types had low preferences. This finding is somewhat different than Pigg, Busch, and Lacy's (1980) analysis which showed no correlation between Kolb's four different types of learners and the teaching methods preferred by those learners. This finding also enhances Lawrence's (1995) compilation of MBTI's use in educational settings,

suggesting that N types prefer methods similar to ACSC's constructivist, essentialist, practical curriculum platform.

This study's findings support the work of Kiersey and Bates (1984), Myers and McCaulley (1985), and Krause (1999), who suggested that N types prefer abstract, more global perspectives; reading and stimulating lecture; discovering underlying concepts and using opportunities for original, inventive work; and general concepts as opposed to detail. This is opposed to S types, who learn better through realism, facts, task precision, and experience rather than written, spoken, or theoretical ideas. Preferring lock-step instruction, repetition, drill, and practice, S types view education's purpose as imparting skills and facts rather than providing opportunities for speculation, personal reflection, and the exploration of possibilities. Also, recalling that Lawrence (1995) asserted that the perceiving dimension (S/N) is the most instrumental dimension with regard to learner preferences, as long as ACSC embraces its stated educational philosophy (see chapter I) and subsequent constructivist view of learning and practical curriculum platform, S types must be prepared for an uncomfortable educational environment.

Finally, the relationship between stated learner preferences and type theory enhances the credibility of the ACSC learning preferences survey. As a post hoc analysis, the MBTI provides criterion validity since favorable responses to the survey's questions statistically significantly correlate to the N type profile while unfavorable responses correlate with S types.

Recommendations for Further Study. This research suggests that the MBTI is a powerful method for determining adult learner preferences but is limited to the constructivist, essentialist, practical curriculum platform at ACSC. It would be beneficial to investigate a broader sample size while using a variety of learner type tests (e.g., MBTI; Hill's; Kolb's; Dunn, Dunn, and Price's--see chapter II) to validate these popular instruments' categorizations. This study suggests that the MBTI perceiving dimension

predisposes individuals to certain teaching methods and actually places individuals into the theorized profile. Would the same hold true for other instruments' categorizations like Kolb's four learner styles?

It would also be beneficial to use this study in a behaviorist, technical curriculum platform to see if S types preferred that institution's methods more than N types. Vocational schools as well as military enlisted training would be two possible avenues for such research.

Hypothesis Number 3

The final hypothesis stated that no statistically significant difference exists between the stated learning preferences of students entering the ACSC curriculum and the same students after experiencing the ACSC curriculum, tested at or below the .05 level. The first subhypothesis was that if learning preferences change, no statistically significant difference exists between personality type and changes in stated learning preferences, tested at or below the .05 level. Finally, the second subhypothesis was that if learning preferences change, no statistically significant differences exist between changes in stated learning preferences and either academic or leadership performance, tested at the .05 level.

Investigation of this hypothesis and related subhypotheses involved several separate analyses. The first analysis examined the overall pre- versus posttest changes in stated learning preferences. The second analysis examined the relationship between changes in stated learning preferences and MBTI. The final analysis concerned changes in stated learning preferences with respect to academic and leadership performance. For this discussion, the first two analyses are considered together.

Changes in Learning Preferences and the Relationship to MBTI. Among the 72 individuals taking the pre and post learning preferences survey, there was a significant change in preference, and this was strongly supported by effect size. Tables 16 and 17 and Figure 2 indicate that this shift was due to statistically significant changes among N type

students. Notably, there was no statistically significant change among the S types. Thus, N types significantly changed their preferences in favor of ACSC's methods over a seven-month time span while S types remained virtually static in their preferences.

Implications. The strength of these findings discredits earlier arguments that changes in preferences were due to external, nonattitudinal influences like misunderstanding survey questions or preoccupation with other circumstances when taking the survey. Table 16 and Figure 2 substantiate that N types overwhelmingly changed their attitude about ACSC's methods while S types only slightly changed. The strength of these statistics is considerable, relieving consideration of coincidence.

These findings enhance Murray-Harvey's (1994) assertion that learning styles are not especially resistant to change and that the Dunn, Dunn, and Price model erroneously assumes that individual learning preferences remain stable over time. In the context of this study, personality type provides an indication of learning style stability for S types only, and therefore type theory appears to contribute to analyses that consider learning preference changes.

These findings also contribute to the implications proffered for this study's second hypothesis because N types had a high preference for ACSC's methods after experiencing the curriculum although nothing was forwarded regarding these students' preferences prior to the ACSC experience. Here, the situation shows an initial neutral preference for ACSC's methods and a later positive response. As mentioned in previous discussion, this finding contributes to Lawrence's (1995) compilation of research using MBTI in academic environments and perhaps adds a new dimension to the N-type learner characterization. That is, changes in preferences could be due to adaptability--N types readily adapted and grew to appreciate ACSC's methods. Considering that N types initially had preferred ACSC methods less than S types did (see Table 16 and Figure 2), there was some initial indifference and perhaps skepticism regarding constructivist learning and practical

curricula among the N types. Then, as they experienced the curriculum, N types became comfortable and embraced this type of learning.

Recommendations for Further Study. The apparent ability of N types to adapt to and embrace new situations, at least in the context of ACSC, should be explored in situations other than academic learning. Adaptability is a trait sought in certain professions, especially those requiring prolonged exposure to unusual circumstances like long range space travel and extended undersea exploration. In an academic environment, one might explore if N types exhibit the same adaptability in learning situations guided by different theoretical foundations. Again, the vocational or military enlisted training situation might be one such situation.

Changes in Learning Preferences and Relationship to Performance. For academic performance, those whose preferences changed either toward more favor or less favor for ACSC's methods performed statistically significantly better than those whose preferences stayed about the same. When comparing the academic performance of those who changed toward more favor with those who changed toward less favor, there was no statistically significant finding. As for leadership performance, there were no statistically significant findings. See Table 18.

Implications. This was an unexpected and unusual finding. Individuals who changed their preferences, either to more favor or less favor of ACSC's methods, performed academically better than those whose preferences changed very little. The common trait here is stated change, negative or positive, which could imply that individuals who decidedly change preferences with a level of personal assurance have a trait that acts to aid in academic pursuits. Looking at the range of values leading to group assignments at Table 5, the negative and positive groups were demarked at a value of -7 and 7 respectively, making assignment to that group contingent on a quantifiable change from the pretest. Hence, individuals changing their preferences did so to a noteworthy

degree. Such a margin portends a decisive change in attitude which may be the same quality that elicits higher academic performance.

Another interesting aspect of this finding is the number of individuals who changed their preferences: only 16.7% changed their preferences toward less favor while 44.4% changed their preferences to more favor ACSC's methods. Indications are that adopting a more positive attitude toward the college's methods is somehow linked to higher academic achievement.

Recommendations for Further Study. While speculative, the described possible connection between decisive change in preferences and academic performance is worthy of continued investigation. Research could focus on educational environments unfamiliar to subjects and a similar pre/post attitudinal survey to measure changes in preferences. It is recommended that a broader instrument be used and there should be some measure of the degree of change. Research could measure the relationship between the degree of change and performance. Further, for those exhibiting little change, there should be some way to measure subject apathy--those with nonchalant attitudes toward the survey's purpose might also have nonchalant preferences and apathy toward academic achievement.

Also, since those who changed their preferences toward more favor for ACSC's methods performed statistically significantly better than those whose preferences remained the same, it might be beneficial to do a study in which some students are consistently and positively encouraged to adopt and embrace ACSC's methods while others are left to simply complete the curriculum. It is suspected that the treatment group, whose attitudes were nurtured toward embracing ACSC's methods, will perform academically better.

Analysis of Student Comments

Although proportionally fewer in number (40%), N types accounted for 54% of the written responses on the posttest. Also, nonaircrew students, comprising 54% of the sample, actually contributed 65% of the responses. As discussed in chapter IV, student

comments were mostly of a negative nature and criticized the school's perceived discrepancy between the desire to foster critical thought while employing subjective, philosophically inconsistent, and poorly evaluated measurement tools.

The perceived emphasis on grading and ACSC's Distinguished Graduate program, whether contrived by the school or student body, led students to describe ACSC as a competitive environment which in turn has created anxiety regarding student evaluation. Within the Air Force culture, and especially among this select caste of military officers, there is genuine concern for career advancement and selection for some of the Air Force's highly selective jobs. Therefore, students are very concerned about grades, selection as a Distinguished Graduate, and personal performance compared to their peers apparently because of the impact these factors have on career advancement and personal aspirations.

The dilemma facing ACSC is complex: the school desires strongly to foster critical thought, producing military officers capable of leading in difficult, life threatening aerospace operations; however, students view the school mostly as a prized yet competitive assignment that will assist in career aspirations if their performance is exceptional. Factors exacerbating this quandary are several. First, ACSC is directed by Air University to have a Distinguished Graduate program, and this necessitates student measurement; therefore, the Distinguished Graduate program cannot be eliminated. Second, ACSC's curriculum focuses on constructivist thought, essentialist practice, and practical curriculum enactment--seemingly contradictory foundations since the essentialist oversight dictates rigorous measurement. Finally, as students noted, in some instances ACSC's faculty lacks credibility. This could be due to the high turnover rate of ACSC's instructors (instructors normally stay for only two or three years); the lack of a professional education background, especially in a postgraduate environment like ACSC; and the lack of credentials beyond master's degrees for most of the faculty.

Thus, this research concludes that student negative comments are due to personal frustration and anxiety concerning ACSC's competitive environment. From the student's perspective, the existence of grading and the Distinguished Graduate program contradicts stated constructivist, practical curriculum foundations, and these frustrations are levied on such causes as the Distinguished Graduate program itself, evaluation methods, instructor quality, and philosophical inconsistencies. As noted in chapter II, the college must reconcile these underpinnings, and, apparently, has yet to completely enact constructivist learning theory and a practical curriculum platform under essentialist oversight. In short, the curriculum needs to be better grounded to ensure consistent implementation among these three pillars of education.

Recommendations for Further Research

Although a minor portion of this study, student comments provided a rich source of data and findings unavailable through this study's mostly quantitative methods. Instead of discussing learning preferences (the focus of the survey), comments were mostly negative and focused on problems with ACSC's curriculum. To further explore these qualitative findings, data triangulation (the use of multiple, different data sources) should be used to gather data that addresses the problem of curriculum inconsistencies. These data would better portray problems in the curriculum and perhaps offer avenues for improvement.

Other qualitative sources would include student and instructor interviews, in-depth record review, and a lengthier survey with fill-in-the-blank type questions. To determine the uniqueness of this study's findings, it would be beneficial to compare comments in Appendix L to the general comments provided by students in previous classes as well as the comments of students who attended ACSC before the curriculum was revised. Another interesting study would solicit comments from graduates of the curriculum to

determine attitudes about the curriculum after a few years of reflection as well as application of the ACSC education in real world situations.

Limitations

This section revisits the limitations described in chapter I and discusses the impact of those limitations on this study's findings. The first limitation was regarding ACSC's near homogeneous population, and this fact revealed itself in the distribution of grades at the college. In agreement with Butler's (1997) research, the final GPA distribution at ACSC was not normal although the large sample size can compensate for this disparity. Table 3 in chapter IV also shows a small standard deviation for GPA and this can contribute to the generally weak effect sizes found in portions of this study's analyses. Thus while the results of this study may not be generalizable to all populations, they may be extended to similar situations such as adult learners at the graduate level.

Another limitation dealt with the use of stated learning preferences which may or may not be indicative of an individual's true learning preferences. In this study the pre/post format also assumed that changes in stated learning preferences would be attitudinal; however, it is possible that students having never experienced a curriculum like ACSC's simply would not understand the situations described in the pretest and only came to understand their actual preferences after the ACSC experience. It is also possible that contrary results were due to some other influence like preoccupation with another situation or physical discomfort. The use of stated preferences is a widely recognized risk (see, for example, Jonassen & Grabowski, 1993). However, again, the large sample size assists in bolstering confidence in the instrument; further, results that are well supported by effect size will exhibit some credibility. Finally, as demonstrated earlier in this chapter, the statistical tests performed to measure changes in student preferences convincingly challenge objections regarding the use of stated preferences.

This study also did not use the MBTI fully, examining only the first two of the MBTI's four-character identifier; further, it did not use strength scores which would reveal the level of preference for a certain personality type. As explained in chapter II, the MBTI groupings were chosen due to known type distributions for ACSC's officers and the resultant skewed group sizes had the study expanded to all 16 possible type codes. This study's choice resulted in four groups with ample sample sizes which helped alleviate the limitation generated by not using strength scores. In short, large sample sizes ensured that the individual groupings generally represented the four type pairs and did not result in groupings populated mostly with borderline cases.

Still another limitation is that ACSC's instructors are not professional educators, and this could be detrimental toward overall enactment of a constructivist, essentialist, practical curriculum. However, Butler (1997) argued that this is not unlike any other adult learning situation where instructors are generally subject matter experts with very little background in professional education. It is therefore substantive to assert that ACSC's instructors are typical of those in adult education environments.

Finally, ACSC's curriculum purposely follows a grounded approach in its pursuit of constructivism, essentialism, and the practical curriculum platform. Further, the stated learning preferences survey specifically queried the methods generally associated with these theoretical foundations. Generalizing this study's findings to curricula of a wholly different grounded design would not be recommended.

Implications

Espoused limitations place this study's utility in the realm of adult education at the graduate level. The large sample size increases the ability to generalize findings; however, the specific nature of the curriculum would limit applicability in, for example, a behaviorist or technical curriculum.

Recommendations for Further Study

To realize more generalizability, a study similar to this could be attempted at the undergraduate level to encompass a less homogeneous sample. At this level, it is recommended that a more accepted, less unique learning preferences survey be used, especially if conducted at a large institution with greater diversity in teaching methods. To determine applicability in institutions grounded in different theoretical underpinnings, it might be beneficial to attempt this study in a more behavioristic, technical curriculum like those found at vocational schools and the military enlisted training environment.

Summary of Specific Conclusions

The various findings for the three hypotheses and student comments are:

1) Adult academic achievement at the United States Air Command and Staff College (ACSC) was better for those individuals having the combination of aircrew career orientation, those not preferring ACSC's methods, and those with an IN Myers-Briggs Personality Type Indicator (MBTI). However, this conclusion was statistically weakly supported, leading to the conclusion that some other independent variable or combination of variables might better explain why some students perform better than others. Based on the literature review and student comments, two promising independent variables are student motivation to perform and student personal interests.

2) Individuals having an aircrew career status performed statistically significantly better in academics; however, this was statistically weakly supported. It is conjectured that ACSC's strong operational flavor, which focuses on warfighting skills, slights the nonaircrew learners.

3) Leadership performance at ACSC was statistically significantly better for those having the aircrew career orientation and NOT possessing the IS MBTI. Again, ACSC's strong operational leanings appear to favor those with an aircrew background. Further, the

subjective nature of ACSC's leadership performance assessment program favors the extroverted life orientation dimension.

4) After experiencing the ACSC curriculum, N type learners tended to prefer ACSC's constructivist, essentialist, practical curriculum methods while S types did not. This conclusion was supported by a moderate effect size and confirms literature regarding type theory learner profiles for the perceiving (S/N) dimension.

5) After seven months experience in the ACSC curriculum, students with the N-type statistically significantly changed their preferences to favor ACSC's constructivist, essentialist, practical curriculum platform. S types changed only slightly, but the change was not statistically significant. These conclusions were strongly supported by effect sizes. This finding adds a new dimension to the N-type learner profile, that these learners appear to adapt to and embrace different academic environments.

6) Academically, those whose learning preferences changed after seven months toward either more favor (44.4%) or toward less favor (16.7%) of ACSC's methods performed statistically significantly better than those whose preferences remained about the same (38.9%). This unexpected and unusual finding leads to the speculation that individuals who decisively change their preferences also possess a related trait that aids in academic achievement. Notably, the majority changed to more favor ACSC's methods and earned higher academic marks.

7) ACSC's students were frustrated by a perceived inconsistency between ACSC's stated philosophical foundations and its measurement techniques. Although desiring to foster critical thought, ACSC's examinations were viewed as prescriptive, narrow, and poorly evaluated. Hence, instead of being thrust into a constructivist, practical environment, students felt the school was competitive, and this is thought to be due to the college's essentialist oversight.

Discussion

The conclusions of this study provide opportunity to discuss issues pertinent to the literature about curriculum grounding, learner preferences, type theory, and student learning. Also, there is sufficient information to make assertions regarding ACSC.

Grounded Curriculum

This study examined an institution which used a grounded curriculum and methods congruent with the learning, educational, and curriculum theories adopted by the school's staff and faculty. It showed that some students preferred the college's methods while others did not. However, student performance was, at best, only weakly related to method, supporting the idea that a grounded curriculum which does not consider learning preferences is similarly effective.

Another important finding is that students can perceive inconsistencies in a curriculum's philosophical foundations especially if the environment is competitive, with performance measures that are incongruent with the institution's theoretical underpinnings. In this study, ACSC student reactions to these inconsistencies support Phillips' (1981) assertion that confusing demands made upon students can result in undesirable learning situations.

Learning Preferences

In agreement with Prorak et al. (1994), this study provides mixed results regarding performance when teaching methods and learning preferences are congruent. In the first instance, this research weakly supported the finding that the combination of all independent variables to include those whose preferences actually disfavored ACSC's methods performed better. Second, looking only at learner preferences, those who favored ACSC's methods did not perform better. However, when looking at changes in learning preferences, those who changed to more or to less preference for ACSC's methods performed better than those whose preferences stayed the same. Since the vast majority

changed toward higher preference, this suggests that those whose attitudes grew to embrace, adopt, or simply accommodate the college's methods actually performed better.

Type Theory

This research substantially contributes to type theory, reinforcing previous findings while adding new insights. It was found that IN types had higher academic performance, which supports Myers and McCalley's (1985) research. Also, in situations where leadership performance is assessed through subjective external observation, IS types received the lowest overall ratings, consistent with this type's less visible, more realistic disposition. When assessing the learning preferences of the various types, after experiencing a constructivist, essentialist, practical curriculum platform, N types stated a preference for the methods used in this environment while S types did not prefer this environment. This confirms the descriptions of N and S type learners forwarded by Kiersey and Bates (1984), Myers and McCalley (1985), and Krause (1999).

It was found that N types readily adapted to ACSC's methods, statistically significantly changing their preferences to favor the school's constructivist, essentialist, practical methodology over a seven month period. This finding, unreported in other literature reviewed by this researcher, indicates an ability to accommodate and embrace new and unique learning situations. This was reinforced by the S-type's virtually static status, where preferences did not change significantly over a seven-month period.

Student Learning and Performance

This study considered student performance which may or may not be an indicator of student learning. This research shows, however, that understanding what makes some students successful is a complex, poorly understood phenomenon. While some studies purport that matching method with preferences increases student learning (as measured by performance), this research could barely support that argument. Student comments as well as assertions by Knowles (1984) and Brookfield (1986) do, however, raise suspicion that

what really matters is student motivation and personal interests. There is a need to isolate specific traits that help to enhance learning, and, although this study speculates that motivation and personal interest could hold a key, it does, as mentioned above, point to student attitude as a factor contributing to improved performance.

The Air Command and Staff College

The United States Air Command and Staff College has an enviable curriculum, enacted by some of the nation's finest individuals, and supported by a top rate facility and equipment. However, this study uncovered some inconsistencies which the college may need to address. For example, those with an aircrew career orientation have a slight advantage in terms of academic and leadership performance. This is most likely due to these officers' knowledge and experiences in aerospace operations as opposed to the expertise typifying, for example, a nurse, chaplain, or computer programmer. Notably, however, this advantage is not strongly supported by statistical effect sizes and leads to the conclusion that the curriculum's intentional focus on aerospace operations expectedly favors those immersed in such activity yet offers opportunity to others.

On the other hand, ACSC may want to reevaluate its methodology for evaluating leadership performance. As Table 11 shows, the IS type, representing nearly 30% of those sampled, does not perform well under the subjective, external observation method the school uses.

Finally, the largest finding this study contributed toward examining ACSC came from individual student comments. It is apparent that students feel ACSC is inconsistent in its curriculum design versus its curriculum enactment. On the one hand, the school claims constructivist, practical enactment, yet, on the other hand, students express anxiety and disappointment with an apparent emphasis on evaluation which is necessitated by Distinguished Graduate recognition.

As a student, faculty member, and curriculum developer at ACSC, this researcher has seen variations of ACSC's evaluation program, all attempting to satisfy Distinguished Graduate requirements while remaining as objective as possible. In every situation, student reaction has been negative. In light of grounded curriculum theory, this research suggests that the linkages between ACSC's underlying learning, educational, and curriculum foundations are poorly established. The inconsistency lies in the school's essentialist oversight while attempting to implement constructivist learning and a practical curriculum platform.

It is recommended that the college reassess its fundamental beliefs about how students learn, how they should be educated, and how the curriculum should be enacted in light of the institution's overarching educational purpose (see Figure 1). The school's leaders must resolve a difficult dilemma, namely, how to implement a Distinguished Graduate program while remaining congruent with its constructivist, practical platform. This pursuit will require readdressing the college's leadership and academic evaluation programs while also developing a credible instructor staff. Notably, an improved instructor development process was also recommended by Butler (1997).

Finally, while the idea of eliminating the Distinguished Graduate program is a familiar student suggestion, student recognition programs in other institutions are not only common, but also well received. Therefore, it is suggested that the school look closely at how students are evaluated from both a procedural and a personal perspective. Here two questions must be answered: is the college using the right tools to evaluate and are the evaluators qualified to evaluate? This is suggested based on the number of comments, suggestions, criticisms, and accolades raised by the 1999 ACSC graduating class.

Summary

This research began by asking whether ACSC's choice to ground a curriculum in specific theoretical foundations overlooked the importance of individual differences in

curriculum enactment. Strong arguments regarding the merits of curricula grounded on theoretical foundations or based on the concept of individual differences are provided in chapters I and II. This research did not confirm the superiority of one approach over another. It did, however, confirm that individuals do have learning preferences; that methods which match preferences can at times improve performance albeit weakly; that inconsistencies in a grounded curriculum can negatively impact some students' educational experience; that type theory assists in determining student learning preferences; and that the key to adult learner performance probably lies elsewhere, perhaps in terms of student motivations, personal interests, or attitudes.

Therefore the curriculist choosing to ground a curriculum in sound theoretical foundations must carefully ensure that linkages among theories in use are consistent. Inconsistent implementations will negatively impact the educational experience. On the other hand, curriculists adopting an individual preferences approach must carefully choose appropriate assessment tools, understand the wide range of teaching methods, and be versed in matching assessed preference with methods.

Unfortunately, the variety of learning, educational, and curriculum theories as well as the diversity in learning style instruments and teaching methods make either approach a difficult endeavor. As in the case of ACSC, an educational environment is in constant need of improvement no matter how well grounded it is. Currently there exists no single unifying theory regarding adult learning and how to enhance the educational experience; however, this research has provided a small contribution to the evergrowing search to improve adult learning.

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APPENDIX A

ACSC AY99 DEMOGRAPHIC FACTS

ACSC AY99 Demographic Facts (as of 24 Aug 98)

ENROLLMENT

USAF	387
ANG	008
AFRES	012
ARMY	046
NAVY	034
USMC	010
Civilian	017
International Officers	080
TOTAL	594

USAF CAREER FIELDS

Pilot	120	31%
Navigator	041	11%
Space/msi/Cmd-Cntrl	036	09%
Intel	018	05%
Ops Spt	005	01%
Log	033	09%
Spt	083	21%
Medical	008	02%
JAG	004	01%
Chap	004	01%
Acq/Fin	031	08%
OSI	004	01%
TOTAL	387	100%

USAF CLASS STATISTICS

Oldest Officer	046
Youngest Officer	032
Male	337
Female	050
BPZ	079
Most Senior Major	1-Jan-96
Most Junior Major	1-Aug-98
Most Junior Officer	4-Apr-89

APPENDIX B

AUBURN UNIVERSITY IRB PACKAGE

AUBURN UNIVERSITY
INSTITUTIONAL REVIEW BOARD
PROTOCOL FOR RESEARCH INVOLVING HUMAN SUBJECTS

Investigator: Joseph H. Reynolds / Major, US Air Force / EFLT / 334-361-4019

Project Title: *Constructivist Learning at the United States Air Command and Staff College: The Impact of Personality Type, Career Background, and Learning Preferences on Academic and Professional Performance*

Proposed Dates of Study: August 17 through 21, 1998 and January 11 through 15, 1999.

Source of Funding: Self and the United States Air Force. Costs are in terms of time and man-hours, not actual monetary exchange.

Faculty Advisor: Dr. Bruce R. Ledford / EFLT / 844-3052

The results of this research will be used for the investigator's DISSERTATION.

Signatures:

_____ _____ _____ _____

Investigator Date Faculty Advisor Date

_____ _____

Department Head Date

FOR AUIRB USE ONLY **AUTHORIZATION #**_____

DESIGNATION: AT RISK_____ DATE APPROVED_____

MINIMUM RISK_____ EXPIRATION OF APPROVAL_____

APPROVED: _____

AUIRB ADMINISTRATOR DATE

1. **PURPOSE OF STUDY**. I work at the United States Air Command and Staff College (**ACSC**) at Maxwell Air Force Base near Montgomery, Alabama, but am temporarily assigned to Auburn University to earn a doctorate in education. I am an active duty officer in the United States Air Force.

I'm interested in ACSC's curriculum and technology implementations which use constructivist methods that enable students to "construct" or create knowledge through self-directed methods, personal reflection, group collaboration, and prolific use of technology. Unfortunately, I believe that this approach unnerves some students and creates disdain for the curriculum from portions of this faction. Thus, I think ACSC's curriculum is embraced by some and disliked by others. I'm curious, therefore, to see what "type" of people like or dislike constructivism as implemented at ACSC and how persons with different learning preferences, personality types, and background (in terms of career specialities like computer programmer, nurse, chaplin, or pilot) perform both academically and professionally. I'd like to investigate these important issues in learning because ***I believe there is a linkage between performance in a constructivist environment and an individual's learning preferences, personality type, and career background.***

2. **SUBJECT POPULATION**. I'm targeting a population of about 500 students at ACSC. These students are all US citizens, adults between the ages of 30 to 50, and military officers. Most (about 400) are Air Force officers while the rest are either Army, Navy, or Marine Corps officers. Over 80 percent have advanced degrees (beyond bachelor's) and they represent the top 20 percent of their respective services in terms of career performance. About 150 students are female.

These students represent the bulk of the ACSC academic year 1999 student body; remaining students are foreign officers and will not be included in the study. My hope is for a 20% survey return which translates to about 100 officers. I base this on my projected categorization of these officers into four major subgroups delineated by Myers-Briggs Personality Type Indicators (MBTI). Although MBTI has 16 total groupings, the overwhelming majority of all military officers occupy the "four corners" of the MBTI matrix where "TJ" types reside. Therefore I will only scrutinize four groups--EN, ES, IN, IS-- and I wanted about 25 individuals per grouping.

- This is NOT a vulnerable population.
- I will need about 100 subjects to validate my study.
- I will provide opportunities to complete my survey to all 600 students (500 US and 100 foreign officers) but will NOT use foreign officer completions for my dissertation.

3. **EXPERIMENTAL METHODS AND STUDY DESIGN**. Through personal research and literature review I can prove that ACSC's curriculum employs constructivist methods; further, I can compare personality type indicators (MBTI) and student background data to academic performance and professional qualities to determine which "type" of students *perform* best. These data are available through ACSC's internal evaluation and academic divisions. However, to complete my research, **I need to know what student *learning preferences* are, how these preferences change throughout the academic year, and what correlations exist between learning preferences and personality types.**

To gather data regarding learning preferences, I'd like to include the attached ten questions on an ACSC student survey. Importantly--***the survey will be administered electronically to all students.*** Let me explain:

> ACSC is on the leading edge in the use of technology in academics--the school functions in a near "paperless environment." Syllabi, readings, assignments, news, correspondence, evaluations, and surveys are a few of the traditional items which ACSC has automated through its network. Further, all students use individually issued laptops and "login" through individual network access points to download information, complete assignments, and perform all functions traditionally

accomplished through more cumbersome "paper methods." My survey can be administered in just a few moments to all 600 students; however, I will leave the survey on the network's server for a week in case students want to complete it at a different time.

In this scenario, therefore, ***subjects will not be "recruited;"*** instead, at the end of their first "course" (actually a short, one-week series of orientation seminars) students will be queried electronically to evaluate the orientation course. Included in that course evaluation will be my brief, ten question survey. Again, this survey will be given in mid August 1998 and represents a single target of opportunity for an unbiased "pre test." The later I wait to administer the survey the more students grow accustomed to the ACSC constructivist environment and the less valid my data become in terms of a "pre test." Further, to determine how preferences change, I'd like to readminister the same survey ("post test") at ACSC in January, 1999. Again, I'd include it as an addition to an end of course evaluation which ACSC administers for all of its ten courses.

Thus, the method is actually simple. The attached survey will be administered electronically in August and January. Students will respond using their laptops and ACSC's network. Results can be tallied by computer as they are downloaded onto the network servers. I will then transfer the data to SPSS 7.5 for Windows for various statistical analyses. Notably, ACSC's network is designed so that personal security is assured--responses to the survey can only come from the "right" person (as indicated on their electronic submission) unless students willingly compromise their network access code.

4. **BENEFITS**. This research will help ACSC in several ways. Other than the obvious benefit of critical examination and refinement of curriculum, ACSC might look for ways to better balance the curriculum if performance favors a certain personality type. In addition, teaching methods could be expanded to appeal to different student learning modalities. On an even grander scale, ACSC's use of technology and its constructivist implementation is the envy of many constructivist scholars; however, should certain students not perform well in this environment or if their learning preferences actually reject constructivist methods, these scholars may rethink their ideas about a curriculum based on constructivism through technology implementation.

5. **RISKS**. There are absolutely no physical, social, and psychological risks associated with this study. Although my research cannot be conducted anonymously, I will guarantee confidentiality. This is because I have to match student learning preferences in both a pre and post test with personality types, academic performance, professional performance, and background.

6. **PRECAUTIONS**. Because there are no risks with this effort, precautions are not a consideration. However, regarding data confidentiality, refer to "PROTECTION OF DATA" below.

7. **LOCATION** of experiments. The survey will be administered at the United States Air and Command Staff College at Maxwell Air Force Base in Montgomery, Alabama. As a military officer and concurrent association with the ACSC staff I have access to both the facility and network.

8. **PROTECTION OF DATA**. Data will traverse a military network secured For Official Use Only (FOUO). Further, data will remain for official use and protected by myself, a military officer possessing a Top Secret military clearance. Although data are not "classified" it will be treated as personally "confidential" (NOT "confidential" in military terms). Once data are consolidated on ACSC's servers I will obtain both a paper and electronic copy. Student names will not be used; instead, ACSC's student number classification system will be used with student numbers matching all data (hence, the "student number" replaces the actual student's name).

I will load data on my personal computer (password protected) onto SPSS for Windows 7.5 for subsequent statistical analyses. All subjects will be classified by a number and no documents in my possession (electronic or paper) will associate name with student number.

9. **SAMPLE OF SURVEY**. See attached survey.

10. **INFORMATION DOCUMENT**. Attached also are two documents to satisfy "informed consent" requirements. The first document ("Suggested Information Letter") is what I want to use to secure student "consent." I suggest use of this format for two reasons. First there is no risk associated with my research (physical, social or psychological) and I personally am insuring confidentiality. Second, *this "document" will appear on student laptops prior to survey completion. Because the laptop's screen size is small and due to human aversion to lengthy computer text, I've kept this information screen as small as possible.* The alternative "NOT Suggested Information Letter" is a more rigorous consent form which will probably reduce the number of responses I get. Obviously I desire the first form to be used, but, due to time constraints, feel it wise to offer the board two versions.

LEARNING PREFERENCES SURVEY

Circle a number on the provided scale to indicate your learning preferences.

1. I like to direct my own learning and prefer to construct personal meaning rather than learning what I'm told to learn.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

2. I prefer to learn through collaborative methods involving several people.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

3. I like learning through activities like case studies, projects, and wargames.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

4. I like examinations which propose ill-defined problems and don't have single solutions.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

5. I prefer to use technology in my studies for both research and production.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

6. The ideal class uses little lecture; instead, I prefer student discussion and group activities.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

7. I do not like multiple choice tests or exams; instead, I like challenging, realistic problems.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

8. Given the choice, I'd rather work in a group than by myself.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

9. In a single course, it's OK for different seminars to emphasize different ideas since learning is best accomplished when classmates share experiences and construct personal meaning.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

10. Learning is best accomplished when resources like computers, visual aids, and wargames are made available for students to pursue personal construction of knowledge.
    1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

Suggested Information Letter

The following would appear on student laptops once they've completed the required Orientation Survey or the End of Course survey:

QUESTIONS ABOUT LEARNING PREFERENCES

The following ten questions ask about your learning preferences. This data will be used in a larger research project designed to investigate ACSC student performance in light of factors like learning preferences, personality type, and background. The researcher, Major Joe Reynolds, is using this data to assist ACSC in refining its curriculum while also satisfying research requirements at Auburn University. These questions address only learning preferences and your participation, though not required, will ***greatly help ACSC in continuous curriculum improvement.***

Any information obtained in connection with this study and that can be identified with you will remain confidential. Results will be published in Major Reynolds' dissertation and provided to ACSC as general statistical analyses. Specifics like student number and individual answers to questions will not be included. Any association between your response and identity will be destroyed upon completion of the research; further, during the course of the research you may withdraw from participation without penalty and your inputs deleted.

- **In no way will confidentiality be compromised.**
- **There are no risks associated with these questions**
- **Your responses will greatly assist in improving ACSC's curriculum and the education of military officer.**

If you have any questions please refer them to Major Reynolds at 361-4019 or jhreynolds@mindspring.com.

NOT Suggested Information Letter

The following would appear on student laptops once they've completed the required Orientation Survey or the End of Course survey:

QUESTIONS ABOUT LEARNING PREFERENCES

The following ten questions ask about your learning preferences. This data will be used in a larger research project designed to investigate ACSC student performance in light of factors like learning preferences, personality type, and background. The researcher, Major Joe Reynolds, is using this data to assist ACSC in refining its curriculum while also satisfying research requirements at Auburn University. These questions address only learning preferences and your participation, though not required, will ***greatly help ACSC in continuous curriculum improvement.***

Any information obtained in connection with this study and that can be identified with you will remain confidential. Results will be published in Major Reynolds' dissertation and provided to ACSC as general statistical analyses. Specifics like student number and individual answers to questions will not be included. Any association between your response and identity will be destroyed upon completion of the research; further, during the course of the research you may withdraw from participation without penalty and your inputs deleted. Also your decision whether or not to participate will not jeopardize your future relations with Auburn University or the department of Education, Foundations, Leadership and Technology. For more information regarding your rights as a participant you may contact the Office of Research Programs, Ms. Jeanna Sasser at (334) 844-5966 or Dr. Leanne Lamke at (334) 844-3231.

- **In no way will confidentiality be compromised.**
- **There are no risks associated with these questions**
- **Your responses will greatly assist in improving ACSC's curriculum and the education of military officer.**

If you have any questions please refer them to Major Reynolds at 361-4019 or jhreynolds@mindspring.com.

HAVING READ THE INFORMATION ABOVE, YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU HAVE ANY QUESTIONS, YOU ARE ENCOURAGED TO ASK MAJOR REYNOLDS BEFORE COMPLETING THE SURVEY. YOU MAY ALSO ASK QUESTIONS LATER BY CONTACTING MAJOR REYNOLDS AT THE PHONE NUMBER PROVIDED ABOVE. BY ANSWERING THESE QUESTIONS AND FORWARDING YOUR RESPONSE YOU INDICATE YOUR WILLINGNESS TO PARTICIPATE.

APPENDIX C

AIR UNIVERSITY SURVEY PARTICIPATION APPROVAL REQUEST

MEMORANDUM FOR HQ AU/XOPA 22 July 1998

FROM: Maj Joseph H. Reynolds, Student AFIT/CI

SUBJECT: Survey Participation/Approval Request

1. Request Air Command and Staff College participation in survey research on student learning preferences. IAW AFI 36-2601 and AU Supplement 1 dated 8 April 1997 the following information is provided for your consideration of this request:

a. PURPOSE AND JUSTIFICATION OF PROPOSED RESEARCH. I work at the United States Air Command and Staff College (ACSC) at Maxwell Air Force Base near Montgomery, Alabama, but am temporarily assigned to AFIT/CI at Auburn University to earn a doctorate in education. I am an active duty officer in the United States Air Force. I'm interested in ACSC's curriculum and technology implementations which use constructivist methods that enable students to "construct" or create knowledge through self-directed methods, personal reflection, group collaboration, and prolific use of technology. Unfortunately, I believe that this approach unnerves some students and creates disdain for the curriculum from portions of this faction. Thus, I think ACSC's curriculum is embraced by some and disliked by others. I'm curious, therefore, to see what "type" of people like or dislike constructivism as implemented at ACSC and how persons with different learning preferences, personality types, and background (in terms of career specialties like computer programmer, nurse, chaplain, or pilot) perform both academically and professionally. I'd like to investigate these important issues in learning because ***I believe there is a linkage between performance in a constructivist environment and an individual's learning preferences, personality type, and career background.***

This research will help ACSC in several ways. Other than the obvious benefit of critical examination and refinement of curriculum, ACSC might look for ways to better balance the curriculum if performance favors a certain personality type. In addition, teaching methods could be expanded to appeal to different student learning modalities. On an even grander scale, ACSC's use of technology and its constructivist implementation is the envy of many constructivist scholars; however, should certain students not perform well in this environment or if their learning preferences actually reject constructivist methods, these scholars may rethink their ideas about a curriculum based on constructivism through technology implementation.

b. USE OF SURVEY RESULTS. This research will be conducted to fulfill requirements for completion of my dissertation at Auburn University. However, because of the nature of the results, ACSC will be interested in my findings. I will therefore share results and provide a short briefing to the ACSC staff.

c. SAMPLE POPULATION. I'm targeting a population of about 500 students at ACSC. These students are all US citizens, adults between the ages of 30 to 50, and military officers. Most (about 400) are Air Force officers while the rest are either Army, Navy, or Marine Corps officers. Over 80 percent have advanced degrees (beyond bachelor's) and they represent the top 20 percent of their respective services in terms of career performance. About 150 students are female.

These students represent the bulk of the ACSC academic year 1999 student body; remaining students are foreign officers and will not be included in the study. My hope is for a 20% survey return which translates to about 100 officers. I base this on my projected categorization of these officers into four major subgroups delineated by Myers-Briggs Personality Type Indicators (MBTI). Although MBTI has 16 total groupings, the overwhelming majority of all military officers occupy the "four corners" of the MBTI matrix where "TJ" types reside. Therefore I will only scrutinize four groups--EN, ES, IN, IS-- and I wanted about 25 individuals per grouping.

- This is NOT a vulnerable population.
- I will need about 100 subjects to validate my study.
- I will provide opportunities to complete my survey to all 600 students (500 US and 100 foreign officers) but will NOT use foreign officer completions for my dissertation.

d. DATA-COLLECTION PROCESS. Through personal research and literature review I can prove that ACSC's curriculum employs constructivist methods; further, I can compare personality type indicators (MBTI) and student background data to academic performance and professional qualities to determine which "type" of students *perform* best. These data are available through ACSC's internal evaluation and academic divisions. However, to complete my research, **I need to know what student *learning preferences* are, how these preferences change throughout the academic year, and what correlations exist between learning preferences and personality types**.

To gather data regarding learning preferences, I'd like to include the attached ten questions on an ACSC student survey. Importantly--***the survey will be administered electronically to all students***. Let me explain:

> ACSC is on the leading edge in the use of technology in academics--the school functions in a near "paperless environment." Syllabi, readings, assignments, news, correspondence, evaluations, and surveys are a few of the traditional items which ACSC has automated through its network. Further, all students use individually issued laptops and "login" through individual network access points to download information, complete assignments, and perform all functions traditionally accomplished through more cumbersome "paper methods." My survey can be administered in just a few moments to all 600 students; however, I will leave the survey on the network's server for a week in case students want to complete it at a different time.

In this scenario, therefore, ***subjects will not be "recruited;"*** instead, at the end of their first "course" (actually a short, one-week series of orientation seminars) students will be queried electronically to evaluate the orientation course. Included in that course evaluation will be my brief, ten question survey. Again, this survey will be given in mid August 1998 and represents a single target of opportunity for an unbiased "pre test." The later I wait to administer the survey the more students grow accustomed to the ACSC constructivist environment and the less valid my data become in terms of a "pre test." Further, to determine how preferences change, I'd like to readminister the same survey ("post test") at ACSC in January, 1999. Again, I'd include it as an addition to an end of course evaluation which ACSC administers for all of its ten courses.

Thus, the method is actually simple. The attached survey will be administered electronically in August and January. Students will respond using their laptops and ACSC's network. Results can be tallied by computer as they are downloaded onto the network servers. I will then transfer the data to SPSS 7.5 for Windows for various statistical analyses. Notably, ACSC's network is designed so that personal security is assured--responses to the survey can only come from the "right" person (as indicated on their electronic submission) unless students willingly compromise their network access code.

e. RELEASE OF DATA. IAW AFI 36-2601, I will comply with the USAF policy for release of surveys and subsequent data.

2. If approved for administration in your organization, the survey and this memo will be forwarded to HQ AU/XOPA for review, AU approval, and assignment of an Air University Survey Control Number (AU SCN). The POC for this survey is Joseph H. Reynolds, Major, AFIT/CI, 334-361-4019, jhreynolds@mindspring.com.

JOSEPH H. REYNOLDS, Major, USAF
Student, AFIT/CI at Auburn University, Al

Attachment:
Proposed Survey

DRAFT - Portions of this survey will be edited by expert panel review.

LEARNING PREFERENCES SURVEY

Circle a number on the provided scale to indicate your learning preferences.

1. I like to direct my own learning and prefer to construct personal meaning rather than learning what I'm told to learn.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

2. I prefer to learn through collaborative methods involving several people.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

3. I like learning through activities like case studies, projects, and wargames.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

4. I like examinations which propose ill-defined problems and don't have single solutions.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

5. I prefer to use technology in my studies for both research and production.
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8. Given the choice, I'd rather work in a group than by myself.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

9. In a single course, it's OK for different seminars to emphasize different ideas since learning is best accomplished when classmates share experiences and construct personal meaning.
   1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

10. Learning is best accomplished when resources like computers, visual aids, and wargames are made available for students to pursue personal construction of knowledge.
    1 (Strongly Disagree) **2** (Disagree) **3** (Agree) **4** (Strongly Agree)

DRAFT - Portions of this survey will be edited by expert panel review.

APPENDIX D

HEADQUARTERS AIR UNIVERSITY RESEARCH APPROVAL
(Electronically scanned image to meet format guidelines)

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY (AETC)

MEMORANDUM FOR ACSC/CVV 23 July 98
Maj Joseph H. Reynolds, AFIT/CI Researcher
IN TURN

FROM: HQ AU/XOPA

SUBJECT: Doctoral Research – AU SCN Assignment

1. The proposed ACSC survey research has been reviewed and is assigned the Air University Survey Control Number, AU SCN 98-35, Expiration Date 23 Jul 99. This assignment is contingent upon the following:

a. The survey will be administered by embedding the items in the standard ACSC computer critique program. This mode of delivery does not facilitate informed, voluntary participation by the students in this research. To comply with AFI 36-2601 the students should be informed of the research objectives and methodology.

b. In the same vein, please ensure adherence to Privacy Act requirements when extracting student data for correlational studies on personality types and learning preferences.

2. It is important to note that all data collected can be requested by the public under the Freedom of Information Act (FOIA). If you have any questions, comments, or concerns, please do not hesitate to contact me at 3-4166. Best of luck in your survey research.

Cheryl Monday

CHERYL MONDAY, GS-12
AU Survey Control Officer

Attachment (paper copy forwarded)
Request Package

APPENDIX E

HEADQUARTERS AIR UNIVERSITY SURVEY PARTICIPATION/CHANGE REQUEST

(Document altered to meet format guidelines)

MEMORANDUM FOR HQ AU/XOPA 4 Nov 1998

FROM: Maj Joseph H. Reynolds, Student AFIT/CI

SUBJECT: Survey Participation/Change Request

1. This change request supplements my original Survey Participation/Approval Request dated 22 July 1998. Because I'm unable to obtain Myers-Briggs Type Indicators (MBTI) from students without individual student approval, I desire to amend my survey instrument as depicted on the attachment. In addition, I desire to administer the attached instrument personally instead of electronically to better explain my need for MBTI data and answer possible questions regarding my research. I will work with ACSC/CVV on the appropriate administrative implementation.

2. The POC for this survey is Joseph H. Reynolds, Major, AFIT/CI, 334-361-4019, jhreynolds@mindspring.com.

JOSEPH H. REYNOLDS, Major, USAF
Student, AFIT/CI at Auburn University, Al

cc: ACSC/CVV

Attachment:
Amended Survey

LEARNING PREFERENCES SURVEY

This short survey assesses your learning preferences in light of the methods used at ACSC and is identical to the survey you were asked to take last August. This survey is being readministered to determine if your preferences change after experiencing the ACSC curriculum. Further, if you did not take the survey in August, you may still answer these questions to assist in improving ACSC's curriculum, but participation remains optional. This data will be used in a larger research project designed to investigate ACSC student performance in light of factors like learning preferences, personality type, and background. The researcher, Major Joe Reynolds, will consolidate and analyze this data to assist ACSC in refining its curriculum while also satisfying research requirements at Auburn University. All information obtained in this study will remain confidential. If you have any questions please refer them to Major Reynolds at 361-4019 or jhreynolds@mindspring.com.

NAME OR STUDENT NUMBER: _____

Please Note: *Your answers will remain confidential; however, to correlate your responses with previous responses and other related data, your identity is needed.*

MYERS-BRIGGS PERSONALITY TYPE (MBTI): _____

Please Note: *If you do not remember your MBTI and desire to participate in this research, please initial in the MBTI block. This gives the researcher consent to use your MBTI four-letter code only. Again, this data will remain confidential.*

Circle a number on the provided scale to indicate your preference for each question. For questions you wish to qualify, please add comments in the provided space.

1. I like learning through reading, note taking, and lecture as opposed to more active methods such as case studies, projects, and wargames.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

2. In the classroom and when I work on academic projects, I prefer to learn through collaborative methods where I work with several people.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

3. I like concrete, specific instruction where I'm told precisely what is expected rather than being given general instructions and encouraged to build my own personal meanings.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

4. I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank tests.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

5. In my studies I prefer to use handwritten notes, texts, and handouts as opposed to technology like computers, networks, and multimedia.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

6. I prefer classes that emphasize discussion, debate, and group activities rather than classes that consist of mostly lecture.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

7. When studying or trying to gain deeper personal understanding, I'd rather work by myself than in a group.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

8. I like instruction in situations where instructors and students collaborate and the instructor focuses on facilitating learning.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

9. I prefer instruction in a firmly managed classroom setting where instructors transmit applicable information and students listen, take notes, and seek clarification of the instructor's teaching.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

10 I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

11. I prefer to learn by being presented and grasping the collective knowledge of a particular subject area as opposed to researching and constructing my own personal meanings.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

12. I like to direct my own learning and therefore prefer broad assignments with limited direction.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

Overall Comments:

_____

APPENDIX F

HEADQUARTERS AIR UNIVERSITY SURVEY PARTICIPATION/CHANGE REQUEST PROCEDURES AND E-MAIL ACKNOWLEDGEMENT

Return-Path: <cmonday@hq.au.af.mil>
Date: Thu, 22 Oct 98 13:40:30 CDT
To: <jhreynolds@mindspring.com>
Cc: <Dasinger=Hank%DER%ACSC@hq.au.af.mil> "Dasinger Hank",
<Gray=Abby%DER%ACSC@hq.au.af.mil> "Gray Abby",
<Milewski=Dave%CVV%ACSC@hq.au.af.mil> "Milewski Dave",
<Perone=Carmen%CVV%ACSC@hq.au.af.mil> "Perone Carmen"
From: <cmonday@hq.au.af.mil> "Monday Cheryl"
Reply-To: <cmonday@hq.au.af.mil>
Errors-to: <cmonday@hq.au.af.mil>
Return-Receipt-To: <cmonday@hq.au.af.mil> "Monday Cheryl"
Subject: re: Major Reynolds Research, Part II
X-Incognito-SN: 586
X-Incognito-Version: 4.11.23

Good afternoon:

Just submit a change statement with the updated surveys. There is no need to re-issue an SCN if the majority of the survey project is the same. As you see, I've included the experts at ACSC in this e-mail. They might have some further administrative suggestions for you.

Please submit the change paperwork to Dr. Dorothy Reed, HQ AU/XOPA. I will be leaving this job as of 23 October, so if you e-mail, then your changes will likely not be recorded properly in the files. Hardcopy addressed to Dr. Reed, HQ AU/XOPA, 55 LeMay Plaza South, Maxwell AFB, AL 36112-6335 will do. Thanks for the update.

CHERYL E. MONDAY, GS-12
Instructional Systems Specialist
Voice - 334-953-4166
DSN Voice - 493-4166

---------- Original Text ----------

From: "Joseph Henderson Reynolds" <jhreynolds@mindspring.com>, on 10/22/98 01:16 PM:

Cheryl,

During August I successfully completed the first part of my doctoral research data collection at ACSC (ACSC SCN 99-02) and am now gearing-up for a post-test in January or Febuary. The reason for this early email is that I need to make a few changes due to an unanticipated obstacle.

In addition to data regarding learning preferences (gathered through the survey I developed and administered) I intend to use Myers-Briggs data. Unfortunately, these data are not accessible without written consent from participating ACSC students. Therefore, when I administer my post-test, I'd like to include an opportunity for students to give consent for my using their Myers-Briggs data. Of course, this will be voluntary and data will remain confidential; further, statements to these effects will be included.

I therefore need to make two changes. First, I need to add a few lines to the instrument to solicit consent for Myers-Briggs data. Second, I wish to implement the survey personally with individual visits to each seminar. I would do this in a manner similar to LTC Butler's method when he did is doctoral research: gaining the in-phase teaching department's approval, coordinating with individual seminar instructors, and administering the survey a few short minutes before or after individual seminar time. I'd ask seminar leaders to gather materials and place them in a single location. This is a change from the electronic administrative method approved by AU/XOPA on 23 July, 1998, and, although I'm not enamored with the idea of visitng over 40 different seminars, this is the best way I can figure to explain my research and get optimum participation--especially for the Myers-Briggs data.

I therefore need to know what you (AU/XOPA) need for me to do to make these changes. Once I meet your requirements, I'll coordinate with ACSC/CVV and Mr. Mike Conn who has the MBTI data. Also--if you can think of an easier way for me to do this-----please advise!

Thanks---Maj Joe Reynolds

Sure will--I won't be able to "crunch" numbers until class graduation (June) and intend to defend in early Fall. So--it'll be a while!

Maj Reynolds

At 05:07 PM 11/4/98 EST, you wrote:
>Maj Reynolds --
>
> Cheryl Monday took a job as Chief Evaulator at the AWC, so I've inherited the
>Survey Control job. I received your 4 Nov memo and am interested in the
>results of your study. Would you please send a copy of your study, when
>completed, to my office at HQ AU/XOPA. Thanks in advance.
>
>Thomas R. Renckly, Ed.D.
>Air University Curriculum Coordinator

APPENDIX G

ACSC CURRICULUM EXPERTS

ACSC Curriculum Experts

1. Richard Muller, Professor of Military History and Vice Dean, Academic Affairs, United States Air Command and Staff College, Maxwell Air Force Base, Alabama. Dr. Muller earned bachellor's degrees at Franklin and Marshall Colleges, master's and PhD in Mlitary History at Ohio State University. He is the author of The German Air War in Russia (1992), co-author of The Luftwaffe's Way of War (1998), and has been published in various book chapters, articles and book reviews. With a background as course developer, teaching department director, and numerous hours in ACSC seminar as well as stage lecture, Dr. Muller's involvement and input into ACSC's curriculum is arguably the most thorough of all those involved in the instrument's review.

2. Steve Butler, Lt Col, USAF. Chairman, Curriculum Development and Integration Department, United States Air Command and Staff College, Maxwell Air Force Base, Alabama. Lt Col Butler has a Bachelor's of Science in Education from Florida Atlantic University, a Master's of Arts in Education Administration from Chapman University, and a Doctorate (EdD) of Education in Administration of Curriculum and Instruction from Auburn University. He was author of "Toward the Twenty-first Century: Air Command and Staff College Curriculum from Theory to Practice" published in the June 1996 issue of Resources in Education and coauthored "Planning and Execution of Conflict Termination" published by Air University Press, May 1995. Lt Col Butler chaired the school's Core Curriculum Review Committee, a group involved in the design, development, enactment, and evaluation of the ACSC curriculum. Further, he was a member of the first ACSC faculty to implement the new ACSC curriculum after Col Warden became school commandant.

3. Jeff Hukill, Lt Col, USAF. Chairman Leadership and Aerospace Power Studies Department, United States Air Command and Staff College, Maxwell Air Force Base, Alabama. Lt Col Hukill has a Masters in Information Systems from Auburn University, Auburn Al, 1995; an MBA from Gonzaga University, Spokane WA, 1984; and a Bachelor's in Business Administration, Norwich University, VT, 1979. He authored "Targeting Financial Systems as Centers of Gravity: No Intensity to Low Intensity Combat", in the refereed journal Defense Analysis, Strategic Studies Institute in London England, 1993. Lt Col Hukill developed lessons for ACSC's resident and distant learning colleges in the War Theory, Conflict Resolution, and Aerospace Operations courses. As Deputy Department Chairman for Curriculum Integration and Design, he ensured all resident courses were integrated, and established the ACSC plan for the Air University Continuum of Education. He was a member of a team established to redesign ACSC's entire curriculum for Master's level accreditation and helped guide the school through successful Department of Education Approval for Master Degree Granting Authority. In his final capacity, Lt Col Hukill directed the ACSC teaching department responsible for one-third of the school's curriculum.

4. Brenda Roth, Major, USAF. Operations Officer, Air Command and Staff College, Maxwell Air Force Base, Alabama. M.Ed., University of South Carolina; MA, University

of Colorado; Ph.D., University of Virginia. Book review for Collaborative Learning: Higher Education, Interdependence, and the Authority of Knowledge, by Kenneth A. Bruffee, published in The Community College Journal (1995). Co-authored a book chapter titled, "Strategies for Using Technology to Reform and Enhance Quality Teaching." The edited book, Effective Strategy Making During Financial Stress was published in 1996. Served as ACSC's Chief of Curriculum Design and Evaluation for one year, working Instructional Systems Design issues Represented ACSC on the AU Degree-Granting and Accreditation Team. As Director of Faculty Development, coordinated all facets of faculty development by integrating the college's three teaching departments. Served also as the college's focal point for curriculum development, lesson and course design, course integration, and teaching and learning strategies.

APPENDIX H

ORIGINAL SURVEY INSTRUMENT

LEARNING PREFERENCES SURVEY

This survey assesses your learning preferences. Although participation is optional, your responses are crucial to improving ACSC's curriculum. This data will be used in a larger research project designed to investigate ACSC student performance in light of factors like learning preferences, personality type, and background. The researcher, Major Joe Reynolds, will consolidate and analyze this data to assist ACSC in refining its curriculum while also satisfying research requirements at Auburn University. All information obtained in this study will remain confidential. If you have any questions please refer them to Major Reynolds at 361-4019 or jhreynolds@mindspring.com.

Circle a number on the provided scale to indicate your learning preferences.

1. I like to direct my own learning and prefer to "construct" or build personal meaning rather than learning what I'm told to learn.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

2. I prefer to learn through collaborative methods where I work with several people to increase knowledge and understanding.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

3. I like learning through active methods such as case studies, projects, and wargames.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

4. I like examinations which challenge me with open-ended problems without single solutions as opposed to multiple choice or "fill-in-the-blank" tests.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

5. I prefer to use technology like computers, the Internet, and multimedia in my academic studies.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

6. I prefer classes that emphasize discussion and group activities to classes that depend on lectures.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

7. Given the choice, I'd rather work in a group than by myself.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

8. In the same course, it's OK for different seminars to emphasize different ideas since learning is best accomplished when classmates share individual experiences and "construct" or build personal meaning.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

9. I prefer instructors who act as "collaborators" or "facilitators" as opposed to "managers" or "transmitters" of information..
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

10. I prefer to use technology like computers, the Internet, and multimedia because it provides more autonomy and information resources in my academic studies.
1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Slightly Agree) **5** (Agree) **6** (Strongly Agree)

Please provide comments here:

APPENDIX I

FINAL SURVEY FOR PRE-TEST

LEARNING PREFERENCES SURVEY

This short survey assesses your learning preferences in light of the methods used at ACSC. Although participation is optional, your responses are crucial to improving ACSC's curriculum. This data will be used in a larger research project designed to investigate ACSC student performance in light of factors like learning preferences, personality type, and background. The researcher, Major Joe Reynolds, will consolidate and analyze this data to assist ACSC in refining its curriculum while also satisfying research requirements at Auburn University. All information obtained in this study will remain confidential. If you have any questions please refer them to Major Reynolds at 361-4019 or jhreynolds@mindspring.com.

Circle a number on the provided scale to indicate your preference for each question. For questions you wish to qualify, please add comments in the provided space.

1. I like learning through reading, note taking, and lecture as opposed to more active methods such as case studies, projects, and wargames.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

2. In the classroom and when I work on academic projects, I prefer to learn through collaborative methods where I work with several people.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

3. I like concrete, specific instruction where I'm told precisely what is expected rather than being given general instructions and encouraged to build my own personal meanings.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

4. I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank tests.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

AU SCN _____

ACSC SCN _____

5. In my studies I prefer to use handwritten notes, texts, and handouts as opposed to technology like computers, networks, and multimedia.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

6. I prefer classes that emphasize discussion, debate, and group activities rather than classes that consist of mostly lecture.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

7. When studying or trying to gain deeper personal understanding, I'd rather work by myself than in a group.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

8. I like instruction in situations where instructors and students collaborate and the instructor focuses on facilitating learning.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

9. I prefer instruction in a firmly managed classroom setting where instructors transmit applicable information and students listen, take notes, and seek clarification of the instructor's teaching.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

10 I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

11. I prefer to learn by being presented and grasping the collective knowledge of a particular subject area as opposed to researching and constructing my own personal meanings.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

12. I like to direct my own learning and therefore prefer broad assignments with limited direction.

1 (Strongly Disagree) **2** (Disagree) **3** (Slightly Disagree) **4** (Neutral) **5** (Slightly Agree) **6** (Agree) **7** (Strongly Agree)

Comments:_____

_____

_____

Overall Comments:

_____

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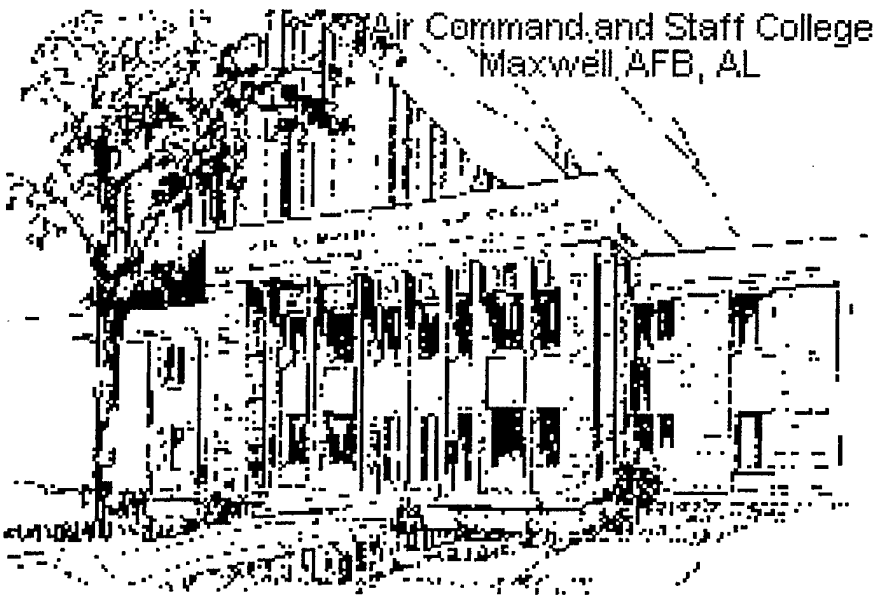
APPENDIX J

FINAL SURVEY FOR POST-TEST
(Electronically altered to meet format guidelines)



An Analysis of Student Performance at the United States Air Command and Staff College by Personality Type, Stated Learning Preferences, and Career Background

---

Dear ACSC Student:

This short survey assesses your learning preferences in light of the methods used at ACSC. It is identical to the electronic survey you were asked to take last August. This survey is being readministered to determine if your preferences change after experiencing the ACSC curriculum. Further, **if you did not take the survey in August, you may still answer these questions to assist in improving ACSC's curriculum**, but participation remains optional. This data will be used in a larger research project designed to investigate ACSC student performance in light of factors like learning preferences, personality type, and career background. The researcher, Lt Col Joe Reynolds, will consolidate and analyze this data to assist ACSC in refining its curriculum while also satisfying research requirements at Auburn University. All information obtained in this study will remain confidential. If you have any questions please refer them to LTC Reynolds at 361-4019 or jhreynolds@mindspring.com.

Thanks,

JOSEPH H. REYNOLDS, Lt Col, USAF
Student, AFIT/CIGK

DEMOGRAPHIC DATA

1. NAME OR STUDENT NUMBER: (*Please Print*) _____

Again, your answers will remain confidential; however, to correlate your responses with previous or related data, your identity is critical.

2. FIRST MIX SEMINAR NUMBER: _____

3. CAREER BACKGROUND: *(Please check one)*

_____ **Aircrew** *(Pilot, Nav, ABM, etc)*

_____ **Non-Aircrew**

4. SERVICE AFFILIATION: *(Please check one)*

_____ **USAF** *(AD, ANG, AFRES)*

_____ **USA, USMC, USN**

_____ **International Officer**

_____ **Civilian**

5 CONSENT TO OBTAIN AND USE MYERS-BRIGGS (MBTI) DATA: *To allow Lt Col Reynolds to obtain and use only the first two of your four MBTI indicators, please sign on the provided line.*

Signature: _____

6. FIRST TWO MYERS-BRIGGS PERSONALITY TYPE INDICATORS:_____

There are four possible indicators: EN, ES, IN, or IS. If you do not remember your MBTI and desire to participate in this research, leave blank and simply sign the consent line above. By signing you authorize the LC 592 contract instructor to provide Lt Col Reynolds only the first two letters of your MBTI results.

SURVEY QUESTIONS

SD	D	SLD	N	SLA	A	SA
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

Please CIRCLE the letter(s) that best represents your preference for each statement.

1. I like learning through reading, note taking, and lecture as opposed to more active methods such as case studies, projects, and war games.

SD D SLD N SLA A SA

2. In the classroom and when I work on academic projects, I prefer to learn through collaborative methods where I work with several people.

SD D SLD N SLA A SA

3. I like concrete, specific instruction where I'm told precisely what is expected rather than being given general instructions and encouraged to build my own personal meanings.

SD D SLD N SLA A SA

4. I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank tests.

SD D SLD N SLA A SA

5. In my studies I prefer to use handwritten notes, texts, and handouts as opposed to technology like computers, networks, and multimedia.

SD D SLD N SLA A SA

6. I prefer classes that emphasize discussion, debate, and group activities rather than classes that consist of
mostly lecture.

SD D SLD N SLA A SA

7. When studying or trying to gain deeper personal understanding, I'd rather work by myself than in a group.

SD D SLD N SLA A SA

SD	D	SLD	N	SLA	A	SA
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

Please CIRCLE the letter(s) that best represents your preference for each statement.

8. I like instruction in situations where instructors and students collaborate and the instructor focuses on facilitating learning.

SD D SLD N SLA A SA

9. I prefer instruction in a firmly managed classroom setting where instructors transmit applicable information and students listen, take notes, and seek clarification of the instructor's teaching.

SD D SLD N SLA A SA

10 I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies.

SD D SLD N SLA A SA

11. I prefer to learn by being presented and grasping the collective knowledge of a particular subject area as opposed to researching and constructing my own personal meanings.

SD D SLD N SLA A SA

12. I like to direct my own learning and therefore prefer broad assignments with limited direction.

SD D SLD N SLA A SA

ADDITIONAL COMMENTS

Please provide comments that amplify any responses above or that generally relate to ACSC's curriculum and your learning preferences.

_____

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APPENDIX K

E-MAIL ANNOUNCING ADMINISTRATION OF POST-TEST

Return-Path: <James.Norris@MAXWELL.AF.MIL>
From: Norris James Col ACSC/DE <James.Norris@MAXWELL.AF.MIL>
To: ACSC_Students <acsc.students@MAXWELL.AF.MIL>
Cc: ACSC_OPS_OFFICERS <ACSCOPS.OFFICERS@MAXWELL.AF.MIL>, ACSC_CVV
<ACSC.CVV@MAXWELL.AF.MIL>, Bitton Foster Col ACSC/DP
<Foster.Bitton@MAXWELL.AF.MIL>, Muller Richard
<Richard.Muller@MAXWELL.AF.MIL>, Hukill Jeffrey LtCol ACSC/DEC
<Jeffrey.Hukill@MAXWELL.AF.MIL>, ACSC_DER
<ACSC.DER@MAXWELL.AF.MIL>, Moore Marlin Maj ACSC/DEX
<Marlin.Moore@MAXWELL.AF.MIL>, Spivey Glen
<Glen.Spivey@MAXWELL.AF.MIL>, "'jhreynolds@mindspring.com'"
<jhreynolds@mindspring.com>, Butler Steve LtCol ACSC/DEX
<Steve.Butler@MAXWELL.AF.MIL>
Subject: Approval for Survey of ACSC Students
Date: Thu, 25 Feb 1999 22:04:03 -0600

During the period 8 to 18 March, Lt Col Joe Reynolds, USAF, will be administering a short survey to each seminar regarding students' learning preferences. Lt Col Reynolds is an ACSC faculty member whom we're sponsoring for a Doctorate of Education (Ed.D.) degree at Auburn Univ. under the AFIT Advanced Academic Degree Program.

Lt Col Reynolds will administer the survey in individual seminars so he can better explain its purpose and answer questions in the more personal seminar environment. This is a follow-up to the original survey administered in August 1998, and, even if you did not participate in August, your inputs are still very valuable. The survey is completely optional, but we strongly encourage you to participate. This study has tremendous potential for strengthening ACSC's curriculum while also furthering research about adult learning preferences in general.

The study will investigate students' performance in light of their learning-style preferences (such as seminar, lecture, applied exercises like war games, individual reading and research, etc.), personality type, and career background. The research question is whether students who prefer certain learning styles perform better under ACSC's curriculum structure than do other students. If this is true, we might want to expand, amend, or otherwise readdress our educational philosophies and associated teaching methods to better accommodate ACSC's diverse student population.

This study satisfies all institutional review board protocols (AU Survey Control Number 98-35; ACSC Survey Control Number 99-02) and should take only a few minutes to administer. It consists of 12 multiple choice questions and 4 demographic identifiers. The survey also asks students to allow use of two of their four Myers-Briggs Personality

Type Identifiers (MBTI). To correlate individual responses to other data, students will be asked to identify themselves on the survey. However, all data will remain completely confidential, and the analysis will make no mention of individual statistics.

Again, your participation is completely voluntary, but we'd sincerely appreciate your cooperation in helping us learn how to improve ACSC's curriculum and teaching methods for future classes. If you have any questions prior to the survey, you may email Lt Col Reynolds at jhreynolds@mindspring.com. Thanks for your assistance.

Col Norris

APPENDIX L

STUDENT COMMENTS

LPS GPA MBTI Occupation

2.3 3.91 IN Non-Aircrew
[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] The premise behind question 10 is somewhat flawed. ACSC does not use technology in any meaningful unique or novel way--except for the toolbooks which are mostly outdated. Most technology use here is simply an electronic equivalent of existing material.

2.5 3.64 ES Non-Aircrew
[Regarding question 1, "I like learning through reading, note taking, and lecture as opposed to more active methods such as case studies, projects, and war games."] A variety of learning methods is required! "One size does not fit all." Wargaming, etc, is good and neat, but is not the end-all.
[Regarding question 4, "I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank."] This is especially true for subjects where I'm going to be graded by the CI. I want to know what he or she believes and why. Then if I disagree, I can explain why. [I] like multiple choice, hate fill-in-the-blank.
[Regarding question 6, "I prefer classes that emphasize discussion, debate, and group activities rather than classes that consist of mostly lecture.] I prefer ACSC classes to emphasize discussion...but some classes are more conducive to lecture.
[Regarding question 12, "I like to direct my own learning and therefore prefer broad assignments with limited direction.."] Depends on the subject matter...

I'm not sure my answers to your questions reflect my truth: I prefer to study for tests, the day/night before the exam, on my own. I prefer to work on briefing slides, developing and polishing them, on my own. For classroom projects, when in a group, I like brainstorming ideas and dividing up the project to individuals and letting the individuals work on their own. At my previous assignment, I often worked with 3 others continuously while developing briefing slides and words to go along w/the slides. So I can work as a group, and I can function well in that setting but I prefer working on my own, at my own pace.

For lecture settings, I prefer to be taught what's expected of me to know, but also like to be taught more. I like multimedia that brings me knowledge and applicability. Dialog among seminar mates is a big help!

My MBTI results last Fall surprised me--I had been tested in the past as an "EN" but last Fall was an "ES" (I believe). Yet, when studying for a test, I exhibit "I" behavior. I'm not certain attempts to correlate MBTI with learning preferences will be fruitfull...

Finally, what motivates us (grades, DG, or just learning or passing time)? I see danger in correlating preferences and MBTI type indicators with "performance" at ACSC!! Why don't you ask us why motivates us? Are we trying to max learning or max grades?

2.14 3.5 ES Aircrew

The ACSC curriculum is great if and when the seminar instructors are competent and credible. Anytime there are unqualified instructors teaching a subject, it gives the AF a BAD name and decreases morale.

Get rid of the DG program!! Too many brown nosers!!! Also, evaluation method is too subjective!!!

3.0 3.5 IS Non-Aircrew

I like balance!!! Difficult subjects require different techniques. Overall ACSC does a good job.

2.42 3.77 ES Non-Aircrew

[Regarding question 2, "In the classroom and when I work on academic projects, I prefer to learn through collaborative methods where I work with several people." I have learned the most through the interchanges while working on projects with my classmates.
[Regarding question 3, "I like concrete, specific instruction where I'm told precisely what is expected rather than being given general instructions and encouraged to build my own meaning."] This applies to AETC courses and not real higher learning organizations.
[Regarding question 4, "I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank."] MC type questions test basic knowledge and essay questions should test the higher level of learning (application).
[Regarding question 5, "In my studies I prefer to use handwritten notes, texts, and handouts as opposed to technology like computers, networks, and multimedia,"] [I] like combo of both.
[Regarding question 8, "I like instruction in situations where instructors and students colloborate and the instructor focuses on facilitating learning."] This has been the case in ACSC so far.
[Regarding question 9, "I prefer instruction in a firmly managed classroom setting where instructors transmit applicable information and students listen, take notes, and seek clarification of the instructor's teaching."] This is not applicable to higher learning environments.
[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] However, they did not give us a modem to access Internet at home--totally unacceptable! Therefore, the idea of flexibility is negated.
[Regarding question 11, "I prefer to learn by being presented and grasping the collective knowledge of a particular subject area as opposed to researching and constructiong my own personal meanings."] Should be a combo of both--depending on the topic,

When we 1st arrived, we were told we were here to learn and that we should think outside of the box. However, after the 1st and 2nd test, our seminar decided that we were not here to learn but to be TRAINED. Due to the nature of the examinations, our class decided that there are ACSC acceptable/right answers--thinking out of the box is not encouraged or praised.

Although I only have a masters, after talking to others who received their PHDs, the environment here at ACSC is not conducive to a true higher learning education. Also, when I received my Master's at Johns Hopkins, it seemed "out of the box" LEARNING was encouraged.

I've been told the reason ACSC is structured this way is because the students complain and therefore there has to be a right and wrong standardized answer. This is a lame excuse. Maybe ACSC needs to come up with a better way to test people. Is regurgitation the goal? Application should be!

2.4 3.59 EN Non-Aircrew

1. Guest lectures provide little breath to debate military issues.
2. Classroom discussions are too "pre-programmed"--little chance to divert off a branch and explore non-programmed ideas.
3. Students should have a project which requires real-world exploration (e.g. get out of the classroom, take theory and apply it--this could involve projects with the Battlelabs, or special takings from Airstaff/MAJCOM organizations).
4. Classroom discussion/lectures as currently organized allow very little time to explore "indepth" concepts and ideas. In many situations its better not to even touch on a subject area vice skim it (as it seems to be the standard practce at ACSC.)

2.37 3.82 IS Aircrew

My answers would change if this was not a "graded" environment ie.

I prefer multiple choice tests (I have yet to miss a multiple choice question at ACSC but don't always answer the essay question in the way the instructor is looking for

If tested I want clear guidance on what is being ask

If not tested I would prefer more learning freedom

2.0 3.5 ES Aircrew

I'm concerned for the non-operator who comes down here. The strong ops content, especially early on, has to put them well behind the power curve. I also feel there should be more opportunities for the electives. Obviously, as quick as they fill up, demand exceeds supply.

5.35 3.95 Non-Aircrew

I think peoples preferences will be based on how they think they will be graded. Someone may prefer learning with broad, less defined objectives, but if they know the test will be graded against stringent, rigid criteria they will be uncomfortable with broad guidelines your teaching and testing approaches need to be consistent. We've been told in the past "we want to hear your ideas" yet test grades seem to suffer if those ideas are beyond some narrow boundaries. This is the perception at least. Recommend future questions include statements on how a student will be evaluated when asking for learning preferences.

3.1 3.68 IN Non-Aircrew

I don't believe ACSC's use of technology is anything more than a substitution for books and paper. It does not integrate the full potential of interactive technology available for education. I believe this distinction may impact the results of question 5 and 10.

2.6 3.73 IN Non-Aircrew

I think it is difficult to encourage self-directed learning and pure academic curiosity in an environment with so many students and with fairly clear outcome objectives or target goals and with the pressure to assign a grade. If the school operated more on a pass/fail basis this freer kind of learning may be facilitated!

5.38 3.91 ES Aircrew

Same general comment as before: just because people "prefer" learning in an older, lecture-style format, it doesn't mean they'll learn more effectively that way. It's good to "stretch" people's learning style although to focus on any curriculum exclusively on any 1 method of teaching is off-target.

2.88 3.77 IS Non-Aircrew

The group projects are a good way to learn but should be limited to groups no larger than about 7.

4.07 3.68 ES Non-Aircrew

In studying, I like to study on my own, come together for a group review and then review again on my own.

2.47 3.55 EN Non-Aircrew

The use of technology at ACSC has slowed me down, because I constantly had to load, unload and manage a computer that didn't have enough memory or speed--on a network that was very slow. Don't implement technology just for it's sake.

4.2 3.73 EN Aircrew

Get rid of the DG program!!! Give instructors more flexibility to teach subject matter rather than welding them to a lesson plan.

2.57 3.64 EN Aircrew

Get rid of the DG program! If it is kept, then make everything independent effort.

3.77 3.91 EN Aircrew

get rid of the DG program

3.44 3.73 EN Aircrew

Essay tests do not allow flexible answers unless the instructor is much more broadly educated.

3.16 3.64 EN Aircrew

I prefer the ACSC format of tests as opposed to multiple choice. It allows you to think more and express what you know, however, the CI has to understand at least as much as the students. There are times when CI's seem to be the lowest common denominator and the learning is diminished. Others have been great--but far fewer.

3.96 3.59 ES Aircrew

Personally, I much prefer an objective versus subjective test. Based on my personal experience, my writing is not equal to others, therefore a subjective written, open-ended test does not reflect on my true level of knowledge.

2.45 3.86 IS Non-Aircrew

I like the mixture of lectures and seminar discussions. Readings and lectures are good for areas I don't know much about such as military history. Seminar discussions are good for operational discussions and war stories that enhance understanding.

3.3 3.12 EN Aircrew

[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] No hard drive space. --with a computer w/no modem? I don't agree with the premise of your question.

Your survey presents an either/or for all types of material. A good deal of the material is knowledge level and presentation in a lecture or reading format is appropriate. At higher levels of learning, discussion or group study is more appropriate. This survey is too simplistic.

2.38 3.73 EN Aircrew

Open ended test questions are great for students but are a nightmare for instructors to grade on a subjective level. It is difficult for the school to allow students to think and respond "outside the box".

One problem that ACSC and other schools around the circle must overcome is the lack of expertise and credibility of instructors. As a former SOS instructor and curriculum developer the hardest obstacle is not developing a changing lesson plan to keep up with the "real world" but teaching instructors to the level needed. Instructors can have a basic knowledge of a subject and still be effective if they use appropriate instruction methods. This is a problem I have personally witness at ACSC, several instructors failed to effectively lead a group discussion and guide the lesson toward the desired objective. ACSC's failure in part is from the limited AIS (1 week) course their instructors attend. While students such as myself can help instructors meet course objectives, but the responsibility should lie with the instructor.

4.38 3.82 ES Non-Aircrew

Delete the "Distinguished graduate" program. It is counterproductive to promoting critical team building amongst field grade officers. It has proven to be unhealthy competition and promote juvinile interactions.

2.28 3.68 IS Aircrew

Many of the responses are based upon too many other factors for a completely accurate answer. Instruction preferences are tied to method of evaluation. If the tests, etc. require clearly defined answers, instruction should match. I disagree with concrete answers in most cases. However, this doesn't seem to fit with the "objective" world of the DG. Seems to get in the way of true academic pursuit.

2.2 3.23 IN Non-Aircrew

Group think--This group is overwhelmingly engineering--male type A. The faculty can be geared toward the majority and the minority displeased, but not unfairly so. The faculty can be geared toward alternative learning styles and water ski even more lightly over the knowledge. Also, those from outside this "box" have learned to consider context, current political trends, and the impact of people moreso than rigid AF protocols or the book answer. Info is info (parts is parts), the 85% answer is a sure-thing unless giving away what you're going to do is unproductive. The student population is not diverse and tends toward Group think on an individual basis--peer pressure presents itself from both the student and faculty side. Critical thinking is <u>not</u> taught here. Therefore comfort is higher for anyone willing to be here. Civilian instructors are excellent in that they present a more academic view; however, good historical presentations with poor <u>current</u> application.

2.2 3.82 IS Aircrew

Your thesis may be slightly flawed--you need to look at motivation versus academic performance. Most people here I know don't care about grades and are looking for the quickest/easiest method of completion, not necessarily excellence.

2.43 3.55 ES Non-Aircrew

In my opinion, ACSC's grading criteria of 5 page essay exams is more a grammer and typing exercise than an evaluation of student knowledge. Students with outstanding typing and writing skills have an advantage. In addition, the leadership point systems is flawed and not a good indicator of people with strong leadership skills.

3.41 3.82 ES Aircrew

Technology: EMail is great, Schedules are great, cyberbooks are bad. Testing: I like "open ended" questions but it seems the school has specific things they are looking for in the "best" answer. (see also: key word search) Testing: If you use T/F or mult choice, you will demand/require too much "knowledge" learning.

2.72 3.45 IS Non-Aircrew
I prefer hands-on instruction and group work.

4.78 3.77 IN Non-Aircrew
I think the best mix for the overall student body here is through both lecture and interactive seminar styles.

2.78 3.82 ES Non Aircrew
Reading to gain personal understanding followed by interactive sessions is best for me. It allows thought, and then refinement.

2.68 3.91 IN Non-Aircrew
ACSC should consider balancing seminar/lecture. In days of only seminar (or group projects) the extroverts dominate conversation/seminar discussions... Some instructors are much better than others at bringing the "Introverts into the discussion" and/or keeping the extroverts on the appropriate discussion topics.

2.66 3.22 IN Non-Aircrew
[Regarding question 4, "I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank tests."] Like open ended questions, but only if instructor is qualified to evaluate the answers.
[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] I like the fact we use technology, but ACSC keeps it very structured with limited flexibility--research paper temple is a good example..

2.8 3.59 EN Aircrew
[Regarding question 4, "I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank tests."] would be more accurate if it reflected broad questions that still require cookie cutter answers to satisfy the school premise or grading outline. Make ACSC pass/fail and kill the DG program and then you can nurture open minded discussions and learning.

2.87 3.36 IS Non-Aircrew
Instruction should consist more of seminar learning that by someone lecturing me for hours at a time. Too much time is spent here in the lecture than in the classroom (seminar) instruction. Too much of seminar learning is too broad!!!

3.25 3.77 ES Aircrew
I am in Col Chuck Holland's elective--Strat bombing. This is what I thought ACSC would be like. Lots of critical thinking, lots of opinion. ACSC concentrates too much on grades and a DG program. Criticla thinking "outside the box" would be much better for learning.

4.46 3.5 EN Aircrew

[Regarding question 12, "I like to direct my own learning and therefore prefer broad assignments with limited direction."] I would agree if the tests allowed us to do this.

[Also] I'm very busy--time is of utmost importance (working on MA & have 4 children). Class "activities" and "discussions" are great for ten minutes, but usually digress. I like to know what I need to understand and memorize so I can get to it. The leadership course is an exception, because we need everyone's experiences, but in most other classes here, we don't need to waste time asking what other people "think." Learn the history, learn the doctrine, then let me get on with something else other than listening to people trying to find something to talk about.

2.36 3.82 ES Non-Aircrew

I like the various methods of teaching and seminar discussion, but I learn the most when after the class I re-read the info to filter for the test.

3.36 3.77 ES Non -Aircrew

I like the research program best. Next best was Joint Operations where we learned and actually applied material.

3.6 3.55 EN Non-Aircrew

It was tough for me to "succeed" in essays that expected regurgitation versus thought/application. I learned ALOT here--I appreciate your study's efforts--good luck.

4.27 3.91 IN Aircrew

I prefer to do collaborative learning. I think that testing may be important to get people to study. I think that essay testing is OK but grading of this type of tests with checklists is poor. If we must provide desired responses and "think within the box" then other testing methods should be used.

4.4 3.82 ES Non-Aircrew

[Regarding question 5, "In my studies I prefer to use handwritten notes, texts, and handouts as opposed to technology like computers, networks, and multimedia," this individual circled the word "computers" and wrote "Boo!!" next to the word.]

[Also] Get rid of the cyberbook readings... bad idea!!!

2.2 3.59 ES Aircrew

When tests, such as those at ACSC are subjective in nature and graded as such, the instruction and guidance must be more directive in nature to ensure that the desired graded items are regurgetated on the exam. To instruct students to learn and think "outside the box" and then grade "inside the box" is a great injustice to those who try to follow the guidance.

3.98 3.86 IN Non-Aircrew

I think the mix is right with lectures, seminars, electives and research. I especially like the research option and the application exercises. The problems I did see are when some instructors are not well-prepared for class (so far only 1 instructor had this problem). The school should push for more PH.D. and experts whenever possible.

4.15 3.82 IS Non-Aircrew

My answers may be somewhat tainted because I came to ACSC from a program where I took graduate-level engineering and math classes that by necessity must be more structured than the style of education at ACSC.

2.6 3.59 EN Non-Aircrew

Seminar environment mixed with lectures are good. Group projects (like JPEX etc) are excellent training tools.

3.06 3.73 ES Non-Aircrew

1) Breakout of pilot/nonpilot is arbitrarily limiting and assumes homogenity in nonaircrew ranks.

2) Consideration should be given to focused instruction that specifically guides students toward desired learning objectives. This is especially true if one must test in the box.

3) Limit the reading to a reasonable amount that is germane to DLOs [desired learning objectives].

2.3 3.73 IS Non-Aircrew

[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] Don't believe ACSC has made overly good use of technology. It's a good first step, but remains user hostile and lacks interaction.

5.64 3.91 EN Non-Aircrew

ACSC readings have been fundamental to my learning. Completing the ACSC seminar prepared me well for attending in-residence. Doing <u>all</u> the readings was key to my success as a student.

2.68 3.41 EN Non-Aircrew

An essay exam is not always the best testing tool. Many of the topics could have been better tested using multichoice, short answer. However, do not make these exams a reading test, where the student is trying to understand the question itself, rather than the material being tested. These type of questions are usually written to make the question harder.

4.98 3.82 ES Aircrew

Sorry to be vague/middle of the road, but it was tough to catagorize and generalize. Bottom line: I like technology stuff, but not for pure readings. (It's tough to read and harder to highlight.) Every course here should push up its suspense and get readings into the coursebook. The exceptions like new doctrine, or the entire strat environment course should provide the hard copy of newely published material. As to class setting, the lectures shold be minimized to subject matter experts, and even then less is more. (Leadership exemption: any 0-7 through 0-10 [General officer] that wants to address us should be given any reasonable amount of time (1 - 3 hourse) to do so) Most subject matter should be introduced via readings/movies/brief lecture then seminar forums, not 13 folks getting another mini-lecture. The payback is, don't try to fool us on the exams. Just list course objectives then test them. I am all for allowing open ended questions...I know it's harder on the faculty and removes emphasis from the current DG program, but I think as Dr Abby likes to emphasize: Critical Thinking!! Honestly, I have not gotten past the first two tiers (know, understand) of learning...there is no analysis, synthesis involved (even though the SOB's [Samples of Behavior] say so!) Good luck!

2.8 3.77 IN Non-Aircrew

My preference for instructional techniques depends on expertise of instructor. ACSC often relies on instructors without expertise in the subject area. Less structured courses are great when you have experienced expert instructors but are terrible when you don't.

3.86 3.95 ES Non-Aircrew

I think the competitive environment ACSC builds is counterproductive to the style of teaching the[y] are trying to achieve. Competitive environment is made by grading, DG program, Top Third program, Academic recognition program and the emphasis "DG" has on promotion (at least the perception). The collaborative, "out of the box" thinking teaching style does not match up. For getting a grade, a firmly managed classroom setting with multiple choice tests is preferred. For in depth learning, collaborative self-paced/project and exercise learning is better provided everyone participates.

2.2 3.55 ES Non-Aircrew

Too many "ACSC solutions" this year. Sure wish ACSC was treated as a "real" graduate program, giving core information and then letting students research and writen about areas of interest--lettint the latter be the grading criteria.

2.6 3.73 IN Non-Aircrew

Need rigorous curriculum--worthy of awarding master's degree and worthy of "top 17%". Need to be challenged, to work hard and not sit back and vegetate for a year. Taxpayers are footing the bill and we need to give them the payback for this year away from operational duties.

2.55 3.91 EN Non-Aircrew
[Regarding question 4, "I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank."] and [Regarding question 12, "I like to direct my own learning and therefore prefer broad assignments with limited direction.."]

assumes that evaluations (tests) truly have no right (school-approved) answer, but allow independent thought as long as it can be supported.

5.9 3.95 EN Aircrew
[Regarding question 8, "I like instruction in situations where instructors and students colloborate and the instructor focuses on facilitating learning."] I prefer group interaction but it is dependent on each CI's ability to guide a group. Not everyone that teaches at ACSC is capable of effectively guiding group discussions.

3.48 3.59 EN Non-Aircrew
[Regarding question 1, "I like learning through reading, note taking, and lecture as opposed to more active methods such as case studies, projects, and war games."] Yes, case study--but not projects/games.
[Regarding question 5, "In my studies I prefer to use handwritten notes, texts, and handouts as opposed to technology like computers, networks, and multimedia,"] Multimedia could be better
[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] Again--toolbook/multimedia on PC could be better.

As an ENTP I find essays a good way to evaluate but feel constricted by the # of pages and need to put specific facts into the paper--I know the concepts and can discuss for hours...but organizing ("P") is tough. Multiple choice lets the "N" in me out of class in record times. As for learning styles--The "EN" of me likes discussions... and the "P" adds variety. As for material--war is a bit less structured than math and sciences. We're forced into the discussion mode. CYBERBOOK IS "KLUDGY."

3.58 3.68 IN Non-Aircrew

At ACSC we study war. War is a complex social phenomenon unlike Algebra, Chemistry, etc. There are not "right" answers. There are too many variables. Not the least of which are people. I'd be careful trying to generalize or cross over survey results between a school that studies war versus a traditional school.

2.7 3.5 IN Non-Aircrew

ACSC, for the most part, doesn't allow for application or higher levels of learning regardless of their claim. CI's tend to perform checklist grading vice allowing for conceptual answers that postulate thoughts on subject matter.

2.0 3.5 IS Non-Aircrew

[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] Cyberbook needs to be accessible from home.

3.46 3.77 ES Non-Aircrew

Transferring costs from the government to the students by forceing us to print out "cyberlibrary readings," schedules, slides, etc. clearly shows the value placed on us and the importance of ACSC. This is a poor use of technology. Why can't ACSC at least pay for toner, paper, 2-sided copies, etc?

3.1 3.5 ES Non-Aircrew

1) ACSC is "one inch deep and a mile wide". It is very fast travel through areas that need more study and discussion.

2) ACSC technology is good in some areas and wanting in others. Email is good. Timeliness of slides is poor. Slides should be available not later than the morning of the presentation. If not, the slides should be available the next day. Integrated war games should be required that cross multiple courses.

3) Instructor attitude's impact learning within each seminar.

2.2 3.36 EN Non-Aircrew

Since it is graded, ACSC tests are better taught with single solutions. In other adult education I prefer self-directed study.

3.13 3.77 EN Aircrew

I prefer andragogical approaches to pedagogical ones.

2.25 3.64 IN Non-Aircrew

Prefer broader assignments that are more open ended but NOT the research program. Think ACSC should have more electives and course taught at a masters level.

2.7 3.86 IN Non-Aircrew

ACSC's curriculum is way too academic. This is PME; we should be teaching specific tasks and encouraging creative thinking. We don't do either. Instead we have social science models and very poor (overall) tests which ask broad questions, but require checklist answers.

5.65 3.82 IN Aircrew

Most of this is subject matter dependent. When covering theoretical, philosophical level material, one learning style is applicable while when being presented less "debatable" material, another style is better.

2.17 3.59 EN Non-Aircrew

Generally ACSC does balance teaching/learning methods fairly well. Although I'd prefer no lectures (or very limited) and more group projects (like JPEX); others don't--so there should be a balance.

3.37 3.77 IN Aircrew

Prefer to hand-write notes instead of using computer because I can use margins, draw, etc. Also helps me remember better. Definitelty prefer open-ended essays. Pol Sci major at the Academy...

2.0 3.24 ES Non-Aircrew

Based on the subject and difficulty level of the topic I prefer various strategies. If highly technical I prefer an instructor driven note taking session. When the subject is theoretical, I prefer self study, group discussion, research. When the subject can be deomnstrated in an exercise or wargame I prefer to participate rather than here [sic] it in a lecture. So keep this in mind, that the answers are not contradictory but subject related, when you go over these results.

2.77 3.82 IS Non-Aircrew

ACSC is hurt by the poor quality of instructors--there are some good ones, but many non-vol who never establish credibility. Cut the class size, make instructor duty here a career nugget that folks want.

3.3 3.91 ES Aircrew

I believe ACSC does it about right. Testing does a good job of determining who understands the material and who does not.

2.17 3.64 IS Non-Aircrew

[Regarding question 4, "I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank."] As long as the instructor is open-minded/qualified enough to handle it

[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] Too hard to "cyber read"

I prefer the group discussion/interaction method of learning. However, which method I really desire depends on the instructor and format of the test and/or how we are being graded and what's expected.

Also, don't believe the career background question adequately captures what the title of the study says. Maybe a better title would be "An analysis of....and differences between pilots and all others." Theres a lot more careers to the USAF than rated/non-rated.

2.87 3.82 EN Aircrew
[Regarding question 3, "I like concrete, specific instruction where I'm told precisely what is expected rather than being given general instructions and encouraged to build my own meaning."] Theoretically--yes--in practice (ie: ACSC) only script answers are sought.

3.6 3.77 IN Non-Aircrew
A lot of the questions are not yes or no, e.g. the subject matter determines whether I choose multiple choice or essay as well as the open mindedness of the person grading the exam. i.e. sometimes I agree and sometimes I strongly disagree, given different scenarios, to the same question.

2.6 3.59 IS Aircrew
[Regarding question 8, "I like instruction in situations where instructors and students colloborate and the instructor focuses on facilitating learning."] Best part (most valuable) of ACSC
It (ACSC) isn't perfect but it has obviously undergone change as a result of feedback. That's the bottom line. Not really too much I want to change as far as "how" learning/teaching is conducted. I'd certainly try to change some of the "what". Lots of redundancy, a little heavy on history, a little light on current issues. Need more operators teaching operationally oriented material.
On another note I vote to get rid of the D.G. program and leadership points--its nothing but fluff.

3.5 3.64 IS Non-Aircrew
The test-taking part of the ACSC curriculum is inappropriate. More of the tests require rote memorization and even those that are structured to look like open-ended tests are obviously graded as if they were fill-in-th-blank. What this causes from a student perspective is cramming the week before the test with the resultant data dump after the test. Unfortunately, the threat of tests is about the only coercive tool to get students to read most of the stuff. Some other method of getting students to read the material needs to be developed.

2.3 3.9 EN Non-Aircrew
ACSC does not understand that adults learn differently than children. AWC, on the other hand, does (my husband attends). My grad school, Johns Hopkins, used adult learning principles and I learned so much more!! First of all, learning was student centered, not instructor centered. The instructor sat down with the students, not lectured from a podium. We looked at the objectives and decided as a group how to accomplish them. There was buy-in from everyone. We used experiential and group exercises (would be helpful in the leadership blocks). We still were graded, had GPAs, etc, even though every class approached the task it had differently! The ringing of the bells further makes it feel like children, as an aside. Our seminar does not act like a team at all--maybe because of the awards program being individual-focused. If we did more experiential exercises, we would learn more from each other. I feel I have so much to contribute, but it is not

appreciated, solicited or wanted from the instructors or other students. As an E, it baffles me that I feel so restricted by one style and method of instruction and curriculum but I don't contribute. As an N, it bothers me!!! The leadership point system definitely discriminates against "I's" who can never get a word in edgewise.

2.4 3.73 EN Non-Aircrew

Clear objectives (learning outcomes) and the expectation of being tested on those objectives is by far the most important aspect of my learning. (IE. teach the test!) Too often this statement has proven true: "ACSC covered all the objectives--those we didn't talk about in class or hear in lecture were covered on the test." Also in courses where we're expected to analyze as an outcome we need a much greater emphasis on practice. The reason I make those comments is my learning style is dependent on the outcome expected.

4.4 3.86 IN Non-Aircrew

Group projects and exercises probably do more to encourage learning than tests. When giving a test that has a precise answer ACSC should give correspondingly precise indication about testable material.

4.78 3.73 IN Non-Aircrew

1) The problem with group projects is the personality of the group impacts your grade.

2) Grading exams that contain the student's "personal meanings" is difficult and subjective--especially if the student's meaing is different from the school's.

3) When grades are important (i.e. distinguished graduate) I prefer concrete, specific instructions.

4) Students should have a strong understanding of the collective knowledge of subject prior to constructing personal meaning.

2.9 3.68 IS Non-Aircrew

[Regarding question 3, "I like concrete, specific instruction where I'm told precisely what is expected rather than being given general instructions and encouraged to build my own meaning."] In general I agree but here at ACSC you have to put the school answer on a test so you can't express personal meanings, defend them, and get an A.
[Regarding question 9, "I prefer instruction in a firmly managed classroom setting where instructors transmit applicable information and students listen, take notes, and seek clarification of the instructor's teaching."] May be OK for math but not the graduate level concepts we cover ain ACSC.
[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] Don't put any more than you already have on the computer. I prefer to read from texts and coursebook.

[Regarding question 11, "I prefer to learn by being presented and grasping the collective knowledge of a particular subject area as opposed to researching and constructing my own personal meanings."] Especially here where there really is no time given for research.

4.7 3.86 EN Non-Aircrew

[Regarding question 1, "I like learning through reading, note taking, and lecture as opposed to more active methods such as case studies, projects, and war games] But I like case studies too.

[Regarding question 2, "In the classroom and when I work on academic projects, I prefer to learn through collaborative methods where I work with several people."} Only colloborative if everyone contributes.

[Regarding question 3, "I like concrete, specific instruction where I'm told precisely what is expected rather than being given general instructions and encouraged to build my own meaning."] The problem at ACSC sometimes is general instruction but then specific evaluation--need compromise.

[Regarding question 4, "I like examinations that have open-ended problems without single solutions as opposed to multiple choice or fill-in-the-blank."] I like both.

[Regarding question 6, "I prefer classes that emphasize discussion, debate, and group activities rather than classes that consist of mostly lecture."] I like both and a mix.

[Regarding question 9, "I prefer instruction in a firmly managed classroom setting where instructors transmit applicable information and students listen, take notes, and seek clarification of the instructor's teaching."] Again I like both and a mix.

[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] The media on laptop isoften not necessary, and only in classroom and not at home where I like to study.

3.0 3.59 ES Non-Aircrew

Although we were told to use our heads, actions don't hold true for that. It appears what is actually desired is for us to regurtitate the school solution. Also seems to be too much reliance on technology. The fancy powerpoint briefings and cyberbook toolbooks are merely delivery tools (just two among many), and should not be considered ends in themselves. Technology doesn't necessarily enhance learning.

3.1 3.59 EN Non-Aircrew

I do <u>not</u> like the cyberbook readings. All course material should be taken from published material or reprinted in the coursebook..

2.5 3.68 ES Aircrew

[Regarding question 10, "I like the way ACSC uses technology like computers, the Internet, and multimedia because it gives me more autonomy and flexibility during my studies."] ACSC is <u>TOO</u> reliant on technology; but it helps -- to a point.

4.36 3.68 ES Non-Aircrew

If the AF wants to make this a true graduate level school akin to a civilian university, then you need to spend the time and money to get CI's that are subject matter experts. Plus they need the academic credentials to merit the title professor not "instructor." We now have an assignment systems that will accomodate this!

2.66 3.64 IS Aircrew

Give me the guidance on what we need to know. Support it with discussions (firmly led). Then hands on reinforcement of learning.

4.24 3.95 EN Aircrew

These questions all need an "it depends" answer. The ACSC measurement devices positively crush self synthesis, opinion, and deeper levels of learning. To succeed in ACSC, you have to learn how and what to regurgitate. With this in mind, most of my answers would shift toward structured, instructor-led, force-feed environment, instead of my normal seminar style, forum/debate type environment that I have indicated int his survey.

2.15 3.73 EN Non-Aircrew

I think my answers on this survey have more to do with the subject matter here than my true learning style preferences. If I was more familiar/experienced in the material being taught I would probably appreciate more flexible, self-determining environment. Additionally, the strong personalities encountered here make many "group" efforts stressful which inhibits true learning in many cases.

2.9 3.77 IN Non-Aircrew

I'm not sure if there's a correlation between LPs earned and MBTI. My guess is that introverts are at a natural disadvantage...

4.15 3.95 IN Non-Aircrew

ACSC should be directed/guided very firmly in what the school wants us to take away from it. Too often the instructor facilitates vs teaches. This is a "college" so instruct me not let us sway back-n-forth. We all want to learn so help us do that but do it clearly and w/much direction

3.9 3.82 ES Aircrew

The type of instruction depends on the desired objectives. It depends