

**CAREER COUNSELING FOR COLLEGE STUDENTS:
THE INFLUENCE OF A COMPUTER-ASSISTED CAREER
DECISION-MAKING PROGRAM ON THE STABILITY OF COLLEGE
MAJOR SELECTION AT A RESEARCH-EXTENSIVE UNIVERSITY**

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
Requirements for the degree of
Doctor of Philosophy

in

The School of Human Resource Education and Workforce Development

By
Mary D. Feduccia
B.A., University of Southwestern Louisiana, 1971
M.Ed., University of Southwestern Louisiana, 1974
May 2003

© Copyright 2003
Mary D. Feduccia
All rights reserved

DEDICATION

This work is dedicated to the very special individuals in my life whose love, support and encouragement provided the inspiration to undertake a project of considerable proportion and the perseverance to develop and complete it. My parents, Jimmy and Bessie DeBlanc, nurtured in me from a very young age a love of learning and the motivation and self-discipline to do my best at whatever I involved myself. My mother's love of life that centered in learning all there was to know about people, places, and things excited me as a child and continues to influence my life today. My father's insistence on completing a job to the best of my ability in spite of difficulties instilled in me the self-determination to set goals and achieve them. To them I am most grateful.

This dissertation represents the culmination of a "project" inspired by my three children, Ashley, Michael, and Allison. As they reached the stage of independence, they provided the impetus for me to revert to an earlier role that I always enjoyed, that of student. Their curiosity and enthusiasm to start new chapters in their young lives sparked the interest in me to continue learning, studying, and reaching new horizons. Throughout my doctoral work and particularly through this dissertation, their enduring confidence in me was a source of great support. To them I am most grateful.

Mildred M. Means, my dearest aunt, deserves recognition as my loudest cheerleader throughout the course of this work. Her love and pride in me were a constant source of encouragement for me. Her admiration and patience are deeply appreciated and will never be forgotten. She bolstered me every step of the way and

shares in my joy as this dissertation and my doctoral program are completed. To her I am most grateful.

And finally, to Mike, my husband, I dedicate this dissertation with heartfelt gratitude for his love, support, encouragement, and endurance. His willingness to allow me countless hours of concentration and his acceptance of the many occasions I spent time with this work rather than with him sustained me. He played a greater role in the creation and completion of this work than he will ever know, and his constant readiness to listen and provide encouragement inspired me every step of the way. He was, and will always be, my champion. To him I am most grateful.

ACKNOWLEDGMENTS

There are several individuals who played an integral role in the development and completion of my doctoral program of studies. Through their guidance and support, they were a constant source of encouragement for me and provided the impetus to make this accomplishment possible. I will be forever indebted to Dr. Carolyn Maddy-Bernstein, my major professor for the first half of the program, for her confidence in me and continued involvement, even after her departure from Louisiana State University. I offer my deepest gratitude to Dr. Geraldine Holmes, another member of my committee, for her overwhelmingly positive enthusiasm at the time I first shared with her my goal of earning a doctoral degree. Dr. Sharon Naquin, one of my committee members and strongest supporters, was an endless source of confidence and inspiration for me. I sincerely appreciate Dr. Margo Abadie's willingness to serve on my committee in place of Dr. Maddy-Bernstein. Her unfailing support motivated and encouraged me through the completion of my dissertation. I thank Dr. Eugene Kennedy for his guidance as the dean's representative on my committee and appreciate the time he devoted in this role. And finally, I extend my deepest appreciation and greatest admiration to Dr. Michael Burnett for assuming the role of chair of my committee halfway through the process. Dr. Burnett's expertise as a teacher and a researcher is unparalleled as is his level of patience and commitment to excellence. His keen insight and remarkable quantitative abilities were integral in guiding this project one step at a time through every stage of its development. He motivated me to do my very best, and through my work with him, he has earned my greatest respect and deepest gratitude.

Other individuals who were very important in the completion of this endeavor are the dedicated professionals on the staff of Career Services at Louisiana State University. Through their encouragement they motivated me in ways they did not realize to learn as much as possible about the field of career development. They were a constant source of support and cheered me on to the completion of my program.

I also express my gratitude to Dr. Joe Abraham of the LSU Writing Center for editing my dissertation with his sharp eye and expertise. He not only edited my work; he taught me to painstakingly review every word I had written and to learn from my mistakes. Ms. Charlotte Robertson was of tremendous assistance with typing the most challenging part of the dissertation, Chapter 4. Her skills as a typist coupled with her sense of humor made the completion of the document possible as well as enjoyable. I appreciate also the help of David O'Brien and Mike Schexnayder who contributed the data necessary to conduct the research. Without their patience with me and willingness to help, the study would not have been possible.

And finally, with sincere thanks I recognize my colleagues and fellow students who were a steady source of support and motivation for me. The friendships developed during my doctoral program with Doris Collins, my mentor, Essie Cockrell, and Debora Baker will be lasting. I appreciated Ron Rush's comradery as we simultaneously made the journey through the dissertation phase of the program. I also recognize the encouragement of Michael Thibodeaux who enthusiastically expressed his confidence in me on a continued basis. These individuals lent an element of support and inspiration that truly made a positive difference in this accomplishment.

TABLE OF CONTENTS

DEDICATION	iii
ACKNOWLEDGMENTS	v
LIST OF TABLES	ix
ABSTRACT	xii
CHAPTER	
1 INTRODUCTION	1
Overview of Career Counseling	1
Rationale	2
Statement of the Problem	5
Purpose of the Study	9
Objectives	10
Definition of Terms	14
2 REVIEW OF RELATED LITERATURE	16
Overview of Career Counseling as a Profession	16
Overview of the Use of Technology in Career Counseling	19
Occurrence and Effects of Career Indecision	24
The Need for Attention to Career Decision-Making	28
Theoretical Bases for Career Decision-Making	34
Characteristics of Undecided Students	40
Styles and Types of Career Indecision	44
Strategies and Interventions for Career Decision-Making	49
Summary	69
3 METHODOLOGY	74
Research Design	74
Population and Sample	75
Data Collection and Instrumentation Procedures	76
Data Analysis Techniques	77
Objectives 1, 2, 3, and 4	77
Objectives 5 and 6	77
Objective 7	77
4 FINDINGS.....	79
Objective 1	79
Undecided Students	79
Objective 2	87
Decided Students	87
Objective 3	95

Objective 4	96
Objective 5	98
Objective 6	106
Objective 7	108
5 SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS	125
Summary	125
Findings	131
Objective 1	131
Objective 2	132
Objective 3	133
Objective 4	133
Objective 5	133
Objective 6	135
Objective 7	136
Conclusions, Implications, and Recommendations.....	137
REFERENCES	150
APPENDIX: VARIABLES IN THE DATA SET	160
VITA	162

LIST OF TABLES

1. Age of Students Who Entered a Research-Extensive University with an Undecided Major	80
2. Race of Students Who Entered a Research-Extensive University with an Undecided Major.....	81
3. High School Academic GPA of Students Who Entered a Research-Extensive University with an Undecided Major.....	82
4. Composite Scores on the American College Test (ACT) for Students Who Entered a Research-Extensive University with an Undecided Major	83
5. Initial Senior College Entered by Students Who Entered a Research-Extensive University with an Undecided Major.....	84
6. Number of Scholarships Received by Students Who Entered a Research-Extensive University with an Undecided Major	85
7. Monetary Value of Scholarships Received by Students Who Entered a Research-Extensive University with an Undecided Major	86
8. Age of Students Who Entered a Research-Extensive University with a Declared Major	88
9. Race of Students Who Entered a Research-Extensive University with a Declared Major	89
10. High School Academic GPA of Students Who Entered a Research-Extensive University with a Declared Major.....	90
11. Composite Scores on the American College Test (ACT) for Students Who Entered a Research-Extensive University with a Declared Major ...	91
12. Initial Senior College Entered by Students Who Entered a Research-Extensive University with a Declared Major	92
13. Number of Scholarships Received by Students Who Entered a Research-Extensive University with a Declared Major.....	93
14. Monetary Value of Scholarships Received by Students Who Entered a Research-Extensive University with a Declared Major.....	94

15. Number of Changes in Major After Initial Selection by Students Who Entered a Research-Extensive University with an Undecided Major ...	96
16. Number of Changes in Major After Initial Selection by Students Who Entered a Research-Extensive University with a Declared Major	97
17. Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Gender	99
18. Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Race.....	100
19. Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and On-Campus Housing	101
20. Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Whether or Not They Had Entered a Senior College.....	102
21. Cross Classification of Students Who Entered a Research-Extensive University as Undecided and Decided and Initial Senior College Entered.....	103
22. Cross Classification of Students Who Entered a Research-Extensive University as Undecided or Decided and Retention	104
23. Comparison of Selected Demographic and Academic Measures by Whether or Not Students Entered a Research-Extensive University with Selected Majors.....	105
24. Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Whether or Not They Changed Majors After the Initial Selection...	107
25. Comparison of Discriminating Variable Means in the Discriminant Model by Whether or Not Students Changed Majors.....	110
26. Summary Data for the Stepwise Analysis of the Discriminant Model for Whether or Not Students Changed Majors	115
27. Structure Coefficients of Discriminating Variables with Discriminant Function Scores	116

28. Classification of Cases by the Comprehensive Model for Whether or Not Students Changed Majors	118
29. Relationship Between Selected Characteristics and the Number of Times Undecided and Decided Students Changed Majors.....	120
30. Multiple Regression Analysis of the Number of Times Undecided and Decided Students Changed Majors on Selected Characteristics ..	123

ABSTRACT

The primary purpose of this study was to determine the influence of Career Discovery I, the first module in a computer-assisted program for career decision-making, on the stability of the choice of college majors. This study sought to determine whether any differences existed in the stability of college majors between students who entered a Research-Extensive University with undeclared majors, used Career Discovery I, and declared a major by the end of the first semester of enrollment and students who entered the same University with declared majors and did not use Career Discovery I during the investigation. In addition, the study compared students who were undecided to those with declared majors on selected personal and academic characteristics to determine their impact on the stability of college major/career choices. Finally, the study sought to determine if a model exists which explains a significant portion of the variance in the stability of college major from selected demographic and academic factors.

The target population for this study was all first semester freshmen enrolled in research-extensive universities in the southern portion of the United States. The accessible population was first semester freshmen in University Center for Freshman Year at the University at which the study was conducted. Through stratified random sampling procedures, a sample of 300 freshmen who entered the University with declared majors and did not use Career Discovery I was compared with a sample of 300 freshmen who entered as undecided, used Career Discovery I, and declared a major by December 2000.

Findings were that students who entered the University as undecided about majors and used the program had a higher rate of retention than students who entered as decided and did not use the program. Additionally, the use of Career Discovery I entered both the discriminant and regression models as a factor that had a significant influence on whether or not students changed majors as well as in the number of times students changed majors. The findings of this study support the use of Career Discovery I as an effective use of Web-based career technology.

CHAPTER 1

INTRODUCTION

Overview of Career Counseling

The origin of the field of career counseling can be traced to the beginning of the 20th century with Frank Parson's approach to helping clients develop an understanding of self and the world of work. Parson's largely intuitive and experiential foundation of career counseling formed the basis for his establishing the Vocation Bureau at Civic Service House in Boston in 1908; this was the first institutionalization of career counseling in the United States (Ginzberg, 1971). The terms career counseling and career development came into more common usage in the 1950s through the work of Donald Super and were institutionalized when the name of the National Vocational Guidance Association (1913-1983) was changed to the National Career Development Association in 1984 (Pope, 2000). The field of career counseling as a specialty area has been recognized since the early 1980s with the establishment of career counseling competencies, credentials, and preparation and ethical standards.

Career counseling is defined as a series of general and specific interventions throughout the life span, dealing with such concerns as self-understanding; broadening one's horizons; work selection, challenge, satisfaction, and other interpersonal matters; work site behavior, communication, and other interpersonal phenomena; and lifestyle issues, such as balancing work, family, and leisure (Engels, Minor, Sampson, & Splete, 1995).

As progress is made in the new millennium, career counselors increasingly rely on the benefits afforded by technology to assist clients in their career development. Sampson (1999a) pointed out that the use of technology to support the delivery of guidance resources and services has been available since the late 1960s with relatively widespread use since the advent of personal computers ten to fifteen years ago. He recognized that the Internet is making an enormous amount of guidance resources directly available to individuals without a counselor or guidance professional acting as an intermediary because simple search engines and web site links make it easy to quickly browse numerous sources of guidance information.

Career counselors will continue to be challenged by issues related to the use of computed-assisted resources that are available to them. Pyle (2000) emphasized the critical role of the career counselor in enhancing learning when technology-driven information is utilized as a means and not just an end. He demonstrated that when the counselor manages the learning process by integrating technology-driven information into counseling, learning increases at a higher level than either information alone or counselor alone. Indeed, technology has opened wide the doors of career exploration and access to occupational information, and responsible and professional counselors are challenged to carefully evaluate its effectiveness.

Rationale

As the career counseling profession has expanded to include the use of computer-assisted career decision-making resources, there is a need to assess the effectiveness of these systems. Howland and Palmer (2000) noted,

We are a profession in search of a new paradigm--a new paradigm that combines the use of technology to facilitate assessment and information gathering along with input from the trained counselor . . . As a profession, we know the “art” (counseling process) and we are learning the technology, but we have not yet developed models that effectively combine the two. (p. 38)

Taber and Luzzo (1999) indicated that “thirty years of using computer-based systems have indeed had positive effects including increased self-efficacy and increased decision-making skill, increased awareness of the need to plan ahead and increased knowledge about specific occupations and greater specification of career goals” (p. 41). Sampson (1999b) advanced this concept by saying that the Internet can be used to expand the resources and services typically offered by career centers. However, according to Sampson, the problem is that the Internet has evolved so rapidly that little information is available on how to effectively integrate emerging Internet-based distance guidance opportunities with resources and services provided by existing career centers.

Sampson further pointed out that some individuals are better prepared than others to engage in information use and learning. As a result, some are more likely to benefit from Internet use than others. Because the use of technology in career counseling is in a formative stage, it is important to evaluate the systems themselves and to determine if the systems are more effective with individuals with certain characteristics, and if so, which ones.

Harris-Bowlsbey and Sampson (2001) echoed the importance of evaluation of computer-based career planning (CBCP) systems in their recommendation that more research is needed on the extent and nature of client and counselor use of CBCP systems. They claimed that the effectiveness of self-help and counselor-

assisted use of CBCP systems for various types of users also needs investigation.

They additionally recommended that the extent and nature of client use of the Internet and CBCP systems need to be examined to determine the most effective way to use this latest innovation in technology.

Computer-assisted career guidance systems that are found to be effective with college students in the career decision-making process can impact the cost of a college education. Students who change majors as a result of career indecision invariably spend more time in earning their degrees than is needed. Meiners (2002) explained that according to the College Board, the average 2001-2002 tuition and fee cost for a four-year private college is \$17,123 per year (up 5.5 % from the previous year). For a four-year public college, the cost is \$3,754 per year (up 7.7 % from the previous year). These figures do not include the approximately \$5,000 per year in room and board costs for students living away from home.

Clearly, there is a need for effective career decision-making assistance and career counseling programs for college students. Virginia Gordon (1995a) reported that educationally and vocationally undecided students have been a concern of college administrators, faculty, counselors, academic advisers, and researchers for over 70 years. However, in the last decade the amount of research and particularly the programmatic attention focused on these students have increased at an unprecedented pace. She pointed out that the reason for this increase can only be speculative, but the persistent numbers of these students and retention concerns may be partially responsible.

Korschgen and Hageseth (1997) recognized that choosing a major and setting career goals are often among the most difficult decisions that college students face and that for many the challenge lies in identifying courses of study and professions that match their interests and abilities. Lewallen (1993) supported this belief as he noted that the data on the number of students who enter higher education undecided or who change their choices along the way is almost always over 50% of any entering class, and finding 75% is not unusual at some institutions.

Retention is a factor that seems to be greatly related to career indecision. Lewallen (1993) explained that college students with unclear or uncertain academic and career goals have been identified in several attrition studies as a dropout-prone population. Undecided students have been the subject of considerable research, and they have been often identified as a key group to target for retention programs. He recognized that personal commitment to either an academic or occupational goal is the single most important determinant of college persistence. Additionally, he believed that students who have not yet identified career options may feel trapped and frustrated and may have little or no commitment to school. Noel (1985) stated that the second major theme of attrition is uncertainty about what to study and is the most frequent reason talented students give for dropping out of college. He claimed that students are clearly dropout-prone unless they get help with the decision-making process involved in declaring a major.

Statement of the Problem

Until fall 2000, all incoming freshmen at a large Research-Extensive University in the south entered Junior Division in University College, unless they

were admitted into the College of Agriculture. Students were permitted to reside in Junior Division until they had earned 60 hours, at which time they were required to enter a senior college or continue in another division of University College, University Center for Advising and Counseling. Effective fall 2000, Junior Division was renamed University Center for Freshman Year to reflect a change in policy regarding the length of time a student could reside in that division before enrollment in a senior college or matriculation in University Center for Advising and Counseling. The importance of early effective career decision-making became more critical because students were expected to meet all requirements for acceptance into senior colleges upon completion of 30 hours, ideally at the conclusion of the freshman year. There was a provision added later to allow students to remain in University Center for Freshman Year until they had earned 45 hours, if they remained undecided about their college majors after 30 hours. However, at the conclusion of 45 hours, all students must leave University Center for Freshman Year and enroll in senior colleges or University Center for Advising and Counseling.

Coupled with the change in policy in the length of time students could reside in University Center for Freshman Year is the concern that the exceptionally large counselor/student ratio in University Center for Freshman Year makes effective career counseling difficult. In fall 2000 there were 10,469 students enrolled in University Center for Freshman Year and 11 counselors, a ratio of one counselor to 952 students. Of these students, 1010 entered as undecided about careers and college majors. In Career Services there are 1.5 full-time career counselors and two to four

part-time paraprofessionals. Career Services offers its services to the university population of 31,000+ students as well as alumni.

In an attempt to address the problems associated with the large enrollment, the limited number of counselors, and the need to assist students in making effective decisions about careers and college majors, staff in Career Services, University Center for Freshman Year, and Computing Services combined efforts to create a computer-assisted career decision-making program called Career Discovery.

Individuals use Career Discovery as required users or as guests. Students required to use the program logon through the University computer system by using the unique usernames and passwords assigned to them at the time of enrollment in the University.

Career Discovery consists of three modules, each designed to assist students in the process of career decision-making. The program incorporates a space exploration theme with space-related icons as part of the site map. Areas of the site include the following information: (1) Introduction, including the importance of career decision-making, the steps in planning a career, etc.; (2) My Career Plan, including view and edit functions for completing a career plan based on usage of each of the three modules in Career Discovery; (3) Choosing a Major, including information regarding specific degree programs at the University, senior college admissions requirements, curricula, and college contact information; (4) Links, including links to information about personality types, Career Services links such as “What Can I Do With This Degree?,” the career testing schedules, departmental Web sites, etc., University College links, as well as links to online career assessments and

career/occupational information; (5) Frequently Asked Questions (FAQs), including answers to questions about the types of courses undecided students may schedule, procedures for declaring a major, transferring to a senior college, etc.; and (6) Contact Us, including contact information and encouragement to contact a counselor about choosing a major and career, or for assistance with a technical problem associated with the use of Career Discovery.

Career Discovery I contains the TypeFocus™ Careers program. Students logon to the licensed site with their University usernames and passwords. They complete the TypeFocus™ Personality Profile through which they identify and confirm their personality types, and then they explore occupations in career clusters commonly preferred by their personality types. This career exploration component culminates in the creation of two reports. Report A: Discover Your Strengths directs students to information about their personality types and work that should be satisfying to them. In Report B: Finding Your Way, students match their personality types to career clusters, clarify their values and interests, identify transferable skills, develop a career focus, and learn about training and education needed for their identified careers. A third report, Report C: Getting the Job, provides information about using personality strengths to obtain jobs and is optional for students required to use the program. Additional information in the form of over 70 help files and hundreds of external links gives users an almost unlimited ability to go as deeply as they want into any of the report topics (TypeFocus Internet Inc., 2002).

After completing Reports A and B, students record the results of the career exploration in the My Career Plan section of Career Discovery. A unique feature of

the system is that counselors in University Center for Freshman Year and in Career Services can view a student's Career Plan through administrative access provided by Computing Services. Hence, when a counselor in University Center for Freshman Year makes a referral to Career Services, a counselor in Career Services can view the career plan developed by the student in University Center for Freshman Year, and vice-versa. In addition, the number of students using the program can be tracked on a monthly basis.

In fall 2000, Career Discovery I, the first module in the newly developed computer-assisted program Career Discovery, was required to be used by all incoming freshmen in University Center for Freshman Year with undeclared majors. Undecided students were not allowed to schedule classes for spring 2001 until they had met with a counselor in University Center for Freshman Year and provided evidence of completion of Career Discovery I. Of the 1010 students enrolled in University Center for Freshman Year who were undecided about careers/college majors in September 2000, 505 had declared a major by December 2000 after completion of Career Discovery I.

Purpose of the Study

The primary purpose of this study was to evaluate the influence of Career Discovery I, the first module in a computer-assisted program for career decision-making, on the stability of the choice of college majors over four semesters. This study sought to determine whether any differences existed in the stability of the choice of college major between students who entered the large Research-Extensive University with undeclared majors, used Career Discovery I, and declared a major by

the end of fall 2000 and students who entered the Research-Extensive University with declared majors and did not use Career Discovery I during the following semesters of investigation: fall 2000, spring 2001, fall 2001, and spring 2002. In addition, the study compared students who were undecided about majors to those students with declared majors on selected personal and academic characteristics to determine if any of the characteristics had an impact on the stability of their college major/career choices. Finally, the study sought to determine if a model exists which explains a significant portion of the variance in the stability of choice of college major from selected demographic and academic factors.

Objectives

The following objectives were formulated to guide the research:

1. Describe students who entered a research-extensive university in the southern portion of the United States with undeclared majors on the following selected demographic and academic measures:
 - (a) Gender
 - (b) Age
 - (c) Race
 - (d) High school academic grade point average (GPA)
 - (e) ACT composite score
 - (f) On-campus housing
 - (g) Initial senior college entered
 - (h) Number of scholarships
 - (i) Monetary value of scholarships

2. Describe students who entered a research-extensive university in the southern portion of the United States with declared majors on the following selected demographic and academic measures:
 - (a) Gender
 - (b) Age
 - (c) Race
 - (d) High school academic GPA
 - (e) ACT composite score
 - (f) On-campus housing
 - (g) Initial senior college entered
 - (h) Number of scholarships
 - (i) Monetary value of scholarships
3. Describe the stability of choice of college majors for students with undeclared majors who entered a research-extensive university in the southern portion of the United States, completed the Career Discovery I career decision-making program during fall 2000, and declared a major by December 2000. Stability for purposes of this objective is defined as:
 - (a) Whether or not they changed majors after their initial selection
 - (b) The number of times they changed majors
4. Describe the stability of choice of college majors for students who entered a research-extensive university in the southern portion of the United States with declared majors and did not complete the Career

Discovery I career decision-making program. Stability for purposes of this objective is defined as:

- (a) Whether or not they changed majors after their initial selection
- (b) The number of times they changed majors

5. Compare a group of students who entered a research-extensive university in the southern portion of the United States with undeclared majors, completed the Career Discovery I career decision-making program during fall 2000, and declared a major by December 2000 with a group of students who entered the same university with declared majors and did not complete the Career Discovery I career decision-making program. The comparison will be made at the conclusion of the fourth semester (spring 2002) on the following demographic and academic measures:

- (a) Gender
- (b) Age
- (c) Race
- (d) High school academic GPA
- (e) College GPA
- (f) ACT composite score
- (g) On-campus housing
- (h) Initial senior college entered
- (i) Retention
- (j) Number of scholarships

- (k) Monetary value of scholarships
6. Compare the stability of choice of college major of a group of students who entered a research-extensive university in the southern portion of the United States with undeclared majors, completed the Career Discovery I career decision-making program during fall 2000 and declared a major by December 2000 with a group of students who entered the same university with declared majors and did not complete the Career Discovery I career decision-making program. The comparison will be made at the conclusion of the fourth semester (spring 2002). Stability for the purposes of this objective is defined as:
- (a) Whether or not they changed majors after their initial selection
 - (b) The number of times they changed majors
7. Determine if a model exists which explains a significant portion of variance in the stability of choice of college major from the following factors:
- (a) Gender
 - (b) Age
 - (c) Race
 - (d) High school academic GPA
 - (e) College GPA
 - (f) ACT composite score
 - (g) On-campus housing

- (h) Whether or not a senior college was entered
- (i) Initial senior college entered
- (j) Retention
- (k) Number of scholarships
- (l) Monetary value of scholarships
- (m) Whether or not they used Career Discovery I

Definition of Terms

1. Undecided student: a student who by the 14th class day of the fall 2000 semester had not declared a college major.
2. Decided student: a student who by the 14th class day of the fall 2000 semester had declared a college major.
3. High school academic GPA: the grade point average computed by the admissions staff at the University for admissions decisions. It is based upon a 4.00 scale and 17 ½ units in high school academic courses recommended by the University for admission.
4. ACT composite score: overall score on the American College Test, the college entrance examination recommended for admission into the University.
5. On-campus housing: residential housing on campus during the freshman year, fall 2000 and spring 2001.
6. Initial senior college entered: the senior college entered after residency in University Center for Freshman Year or University Center for Advising and Counseling.

7. Scholarships: the number of scholarships awarded during the four semesters of investigation for academic merit.
8. Retention: enrollment at the University by the conclusion of the spring 2002 semester.
9. TypeFocusTM Personality Profile: an online personality profile. Split-half reliabilities for each type factor range between 85-93%; correlation of each type factor to the Myers-Briggs Type Indicator instrument ranges between 71-78% (TypeFocus Internet Inc., 2002).
10. Age: the age of subjects from date of birth in days, months, and years as of August 1, 2000.

CHAPTER 2

REVIEW OF RELATED LITERATURE

The literature reveals a wealth of information related to career decision-making by college students and the increasing use of technology in career counseling. The purpose of this review of literature is to construct a framework for the body of knowledge related to career decision-making in six broad areas: (1) the occurrence and effects of career indecision, (2) the need for attention to career decision-making, (3) the theoretical bases for career decision-making, (4) the characteristics of undecided students, (5) styles and types of career indecision, and (6) strategies and interventions for career decision-making. Prior to the exploration of these topics, an overview of career counseling as a profession and the use of technology in career counseling are provided.

Overview of Career Counseling as a Profession

The birth and subsequent development of career counseling as a profession in the United States has occurred during times of major societal changes recognized by Pope (2000) as having occurred in six distinct stages:

In the first stage of the development of career counseling in the U.S. (1890-1918), placement services were offered for an increasingly urban and industrial society. In the second stage (1920-1939) educational guidance through the elementary and secondary schools became the focal point. The third stage (1940-1959) saw the focus shift to colleges and universities and the training of counselors. The fourth stage (1960-1979) was the boom for counseling, and the idea of work having meaning in a person's life came to the forefront; organizational career development began during this period. The fifth stage (1980-1989) saw the beginning of the transition from the industrial age to the information age and the growth of both the independent practice of career counseling and outplacement counseling. The sixth stage (starting in 1990), with its emphasis on technology and changing demographics, has seen an increasing sophistication in the uses of

technology, the internationalization of career counseling, the beginnings of multicultural career counseling, and a focus on the school-to-job transition. (p. 194)

Federal legislation passed during the 20th century had a major impact on the development of career counseling. Hoyt (2001) reacted to Pope's stages in the history of career counseling by pointing out that the historical stages in the development of career counseling are most appropriately organized around federal legislation. He suggested that Pope's Stages 1 and 2 can be viewed as common to all kinds of counselors because they do not involve any specific federal career counseling legislation. On the other hand, Pope's Stages 3-6 are all connected to a wide variety of federal laws, each of which applies to counselors in some settings but not in others. Of particular importance was the passage and implementation of the National Defense Education Act (NDEA) in 1958; Hoyt recognized this piece of legislation as having a greater influence on the career counseling movement than any other single event. As a result of the NDEA, graduate programs in counselor education increased dramatically. Hoyt pointed out that shortly before the passage of NDEA, Congress had enacted legislation calling for career counselors in both vocational rehabilitation and veterans administration settings. This movement led to the United States Employment Service undertaking an effort to equip its career counselors with some expertise by sponsoring a variety of short-term programs and workshops.

The 1963 revision of the 1961 Federal Vocational Education Legislation contained a provision for establishing a career guidance and counseling branch and provided funds that local K-12 school systems could use in implementing career

guidance programs, with up to \$10 million of federal education funds per year for use in career education from 1974-1982. The most recently enacted federal legislation that affects the field of career counseling is the School-to-Work Opportunities Act and the Workforce Investment Act (Hoyt, 2001). Such legislation sparked increased interest and enthusiasm about the field of career counseling, and momentum continues to grow.

In addition to the recognition of Frank Parson's approach to vocational guidance as the precursor to career counseling and the growing body of heuristically-based theories of career development, Engels, Minor, Sampson, and Splete (1995) traced the development of career counseling as a specialty area according to the following historical landmarks:

1. The establishment and subsequent revision of career counseling competencies by the National Vocational Guidance Association (1982), now the NCDA (National Career Development Association Professional Standards Committee, 1992/1994), helped define career counseling as a specialty.
2. The establishment and subsequent revision of career counselor credentialing by the National Council for Credentialing Career Counselors (Smith & Karpati, 1985), which evolved into the National Certified Career Counselor (NCCC) specialty certification sanctioned by NBCC (Sampson & Loesch, 1991), further defined career counseling as a specialty.
3. The establishment and subsequent revision of preparation standards by the Association for Counselor Education and Supervision (ACES, 1973, 1979) and the Council for Accreditation of Counseling and Related Educational Programs (1982, 1988, 1994a) include life span and career development as a core counseling element, as well as the establishment of specialty preparation standards for career counseling (Council for Accreditation of Counseling and Related Educational Programs, 1994b).
4. The establishment of ethical standards by NCDA (National Career Development Association, 1988, 1991/1994b) and selected state and federal laws aimed at promoting career development and regulating career counseling practice also expanded the career specialty definition. (p. 135)

Overview of the Use of Technology in Career Counseling

Oliver and Whiston (2000) summarized current trends in Internet career assessment and recognized that technology has had a major influence on the delivery of career services and career assessment in the last millennium. According to Oliver and Chartran and Reile and Harris-Bowlsbey (as cited in Oliver & Whiston, 2000), projections are that technology, in general, and the Internet, specifically, will have a major influence on career assessment. They believe that the availability of career assessments on the Internet will continue to expand, the number of users will grow, and the capabilities of such sites will be enhanced as technological sophistication increases.

Oliver and Zack (1999) evaluated 24 sites offering no-cost assessments. They found that sites varied substantially in the scope of their offerings and in the quality of their measures and interpretative materials. They noted that there has been very little scholarly investigation of career assessment sites that charge a fee for their use.

In Oliver and Whiston's summary of current trends, they recognized that the ability for individuals to access career assessment over the Internet has several advantages as well as some potential problems. The advantages include the ease of access from remote locations and the ability to integrate valid career assessments with other career resources like occupational information and goal-setting exercises. They recognized as additional advantages the real-time interactivity which can provide immediate feedback with video and audio files that are engaging and stimulating to users.

Problems with Internet assessments include concerns with psychometric qualities of the assessments. Oliver and Zack (1999) found few Internet career assessment sites that provide information on the psychometric characteristics of the assessment tools. Another potential problem noted by Sampson and Lumsden (2000) concerns confidentiality. They raised the possibility that some sites may not be secure and can gather personal information that could be used for commercial purposes. Another problem Oliver and Whiston identified is related to the unmonitored nature of the Internet; they emphasized that responsibility for appropriate use rests with the site developers and the Internet users.

In examining the challenges presented by the “information highway” in the process of providing career counseling services via the Internet, O’Halloran, Fahr, and Keller (2002) emphasized the importance of the National Career Development Association Ethical Standards (NCDA, 1991) and the NCDA Guidelines for the Use of the Internet for Provision of Career Information and Planning Services (NCDA, 1997). This organization has developed ethical guidelines to guide the discussion of, and possible resolutions to, challenges posed by incorporating the Internet into career counseling.

O’Halloran, et al. recognized that although most counselors continue to practice face-to-face counseling with their clients, the Internet is quickly becoming a standard counseling tool for career counselors. In understanding the proliferation of the use of Internet by career counselors, they conducted a search for career-related Web sites and found from 256 to 23,137, depending on the search engine and search

term used. As they pointed out, the rapid change of Web site addresses and the need for frequent updating limit the usefulness of these lists of Web sites.

Sampson (1999a) explained that Internet-based career resources and services are delivered by integrated and independent Web sites. An integrated Web site is the distance guidance component of a career center operation, typically providing organization-specific information (e.g., program of study descriptions) as well as links to Web sites in the larger organization (e.g., academic departments) and independent Web sites judged to provide relevant career resources and services.

He further explained that resource-based vs. need-based Web sites have become popular. A resource-based Web site allows users to select from various resources and services they determine to be relevant to their needs, while a need-based Web site allows users to clarify their needs prior to selecting resources. The process concludes with an exploration of the links to independent Web sites that relate to their needs, thus reducing the likelihood of following an inappropriate link. Career information delivery systems (CIDS) have been used since the late 1960s to stimulate career exploration and decision-making by integrating assessment, matching, and information dissemination. Sampson appropriately pointed out that many examples of poor quality assessments and information currently exist on the Internet.

Offer (1997) classified computer applications in career guidance as follows:

(1) self assessment, (2) matching systems, (3) information retrieval, (4) games and simulations, (5) decision-aids, (6) dedicated word processors for writing a CV or resume, (7) computer-based training for job seeking skills, and (8) psychometric tests. Some of these computer applications are designed to function independently and are referred to as “mini” systems,

while “maxi” systems integrate many of these types of software into a single system. Maxi systems have the advantages of ease of use across components, ease of sharing data among components, and modeling of the decision-making process. Mini systems have the advantages of lower development costs and greater flexibility in choosing components to meet specific needs. (p. 3)

Sampson (1997) noted that computer-assisted career guidance (CACG) is a system of interrelated assessment, generation of options, and information dissemination subsystems, often coupled with counseling interventions and various print and media-based support resources that are used within organizations to assist individuals in making career decisions. Assessment, search for options, and information delivery are the core components of a CACG system. He reported that the two most important innovations in the design and delivery of CACG systems are the use of multimedia-based information and the integration of CACG systems with the Internet.

Gati (1994) viewed attempts to computerize parts of the counseling process as a way to structure career counseling. He discussed dilemmas and problems associated with the structured procedures found in CACGSs and identified them with many of the issues which arise in face-to-face counseling. He cautioned that although during face-to-face counseling many of the issues and problems are handled implicitly, the solutions in CACGSs need to be explicit and planned ahead.

Harris-Bowlsbey offered insight into the lifeline of career development interventions in a study she coordinated with Dikel and Sampson, Jr. (2002). She explained that the Internet offers an exponentially-increased potential for the delivery of career development services to a vast, geographically-dispersed audience.

She pointed out that in addition to all of the capabilities of standalone computers, the current technology offers high-quality career information any time, any place without a fee and the potential for face-to-face supportive assistance in electronic mode. She cautioned that as professionals, counselors are facing this new phase of technology with skepticism and concern, and she questioned how the next generation of counselors will be trained to use it effectively and how the quality of information available in this mode will be monitored.

Kirk (2000) provided additional insight into the widespread use of Internet resources through his exhaustive summary of applications and issues related to Web-assisted career counseling. In noting the difference between sites focused on career planning and those with emphasis on career information, he included a number of specific suggestions for using Internet resources in counseling and emphasized the value of Web-based self-assessment instruments for career planning.

The role of the Internet in career assessment was one of the areas of research Luzzo and MacGregor (2001) included in their summary of the career counseling and development literature published in 2000. They noted that exploring the role of the Internet in career assessment was clearly one of the most popular career counseling and development topics that appeared in the literature in 2000. Gore and Leuwerke (2000) provided a rich overview of modern Internet systems and discussed their potential benefits to career development professionals who choose to engage in Internet-based assessment. Prince, Chartrand, and Silver (2000) discussed the steps involved in planning and delivering a high-quality, Internet-based career assessment, using <http://www.careerhub.org> as a model.

Additionally, Luzzo and MacGregor (2001) found that a major theme that emerged from their review of the literature was the acknowledgement among career development researchers and practitioners alike that the Internet and other technological advances have direct relevance to the practice of career counseling. They suggested that rather than lagging behind in the application of technology in the profession, career counselors and vocational psychologists have forged ahead with the examination and consideration of various ways to harness the benefits of such technology in advancing the profession.

Occurrence and Effects of Career Indecision

Gordon (1982) summarized many of the earlier studies and charted the incidence of indecision among high school seniors and college freshmen. Crites (1981) reported that the percentages of undecided students in these studies varied from 5% to 61% over a span of 50 years. Astin (as cited in Gordon, 1982) cited data that suggest that the number of undecided students entering colleges and universities continues to vary from year to year. Astin claimed a 10-year nationwide comparison of college freshmen indicated that the number of students who were undecided about a field of study increased from 5.5% in 1969 to 20.8% in 1979.

According to Larry Salters (1985), the number of undecided students in today's colleges and universities ranges from 22% to 50%. The number who change majors is estimated to be between 50% and 60% (Gordon, 1982). She pointed out that research studies in the area have resulted in conflicting data that make the overall picture on undecided students confusing. Studies by Crites (1981), Foote

(1980), and Salomone (1982) are in agreement that undecided students tend to drop out of college at a greater rate than do decided students.

Patti Boyd (1988) enlarged the issue of undecided students by recognizing the population of students who declare a major, but who are uncertain of it, and those who declare a major and seem certain of its fit, but later elect to change it. She reported that at the University of Toledo, the administration expects nearly one third of each entering class to change their major at least once throughout their academic career and some as many as three times. She recognized that there are many negative attitudes attached to being undecided and changing majors. Students may feel as though they are without direction, disappointing friends and family, unaffiliated with an academic department, etc. Parents often feel that their child is without direction, and regard undecidedness as a financial burden. Boyd reported that administrators often impose rules on students which make indecision and changing majors detrimental to academic progress. They require major-specific courses within the first year, allow little flexibility from college to college, and often do not emphasize the advantages of taking all general requirements first.

King and Gressard (1979) conducted research at The University of Iowa and found that students who did not declare a curriculum major when they first enrolled graduated at a lower rate than those who did. These undecided students, however, were not shown to differ from their peers in ability, as measured by ACT scores. This research led to the assumption that many capable students were dropping out of college due to unfocused academic plans.

According to London, Lee, Manuele, and Caroline (1985), individuals vary in their readiness to make career decisions; yet, ignoring the process does not make critical issues disappear. They pointed out that for unprepared young adults, there is often the feeling of powerlessness owing to their inability to cope with or take charge of their lives by making satisfying decisions regarding matters that touch them personally. Independent research studies by Schultz, Gibb, Weinstein and Fantini, Loppett and Schindler-Rainman, and Howe and Howe (as cited in London, et al., 1985) indicated findings that control over one's life is a universal, human concern. London, et al. (1985) expressed the importance of effective career decision-making with the following statements:

To the extent that we provide students with decision-making skills, we help to fulfill individual potential and build the self-esteem on which healthy personalities are based. As students practice making thoughtful decisions and acting upon them, they can develop a sense of personal worth. They can also develop an awareness of the values which make them who they are and what they would like to be. (p. 285)

Brown (1981) echoed this importance when he stated that in many instances, schools are preparing students for careers that do not now exist, so they must equip students with skills that are transferable from one job to the next.

Cooper (1986) pointed out that career indecision has emerged as an important dimension of the vocational decision-making process, particularly for those who experience difficulties choosing an occupation during adolescence and young adulthood. Cooper recognized that as college students are involved in learning and in making academic, career, and life decisions, they approach these processes from unique and highly personal perspectives, and they need to understand how their

decision-making is influenced by the way they incorporate attitudes, perceptions, judgment, and other personality variables into their unique approaches.

Luzzo (1999) presented an interesting perspective on college students' career decision-making. He recognized a growing need to respond to the expanding population of nontraditional college students by developing age-appropriate career development programs because estimates indicate that between 33% and 50% of today's college students are over the age of 25. Luzzo reviewed research on age-related differences and praised Crite's model of career maturity which claims that an individual's attitudes and emotional reactions toward making career decisions are important properties in career maturity. Older students tend to exhibit attitudes toward the career decision-making process that demonstrate a lack of anxiety and fear, whereas younger students are more likely to exhibit attitudes indicative of insecurity and general concern about making career decisions. However, he reported that from the existing literature on the topic, nontraditional students are not so advanced in their career development that they need substantially less guidance in career planning and decision-making. He suggested that career counselors should recognize the widespread need for career exploration among students of all ages.

In a report on the 2000 Graduating Student & Alumni Survey conducted by the National Association of Colleges and Schools, Nagle and Bohovich (2000) stated that most respondents appeared to have entered college with a fairly good idea of the type of career they wanted to pursue. More than half (52.3%) revealed they had never changed majors. However, more than a quarter of the respondents (27.9%)

had changed majors once; 6% had changed majors three times; and 1.9% had made the switch four or more times.

Gianakos (1999) noted that students are making vocational decisions very early in their academic training, but that nearly 50% of freshmen surveyed nationwide desired assistance in making career decisions. Based on her research, Gianakos suggested that over 50% of declared students will change their major at least once during college, so constructing a dichotomy of decided versus undecided students is artificial.

The Need for Attention to Career Decision-Making

Francis Wood (1995) recognized that careers are destined to change dramatically with the infusion of currently available and emerging technology. She claimed that this reform demands new visions that shift emphasis from helping people make initial occupational choices to assisting clients develop a life plan that will allow for harmony and balance among the life roles.

According to Patti Boyd (1988), our society has grown to view college as training for a variety of occupations, and career development plays a role in their ability to make academic commitments. Astin, Green, Korn and Schalit (1986) conducted a survey of over six million freshmen and found that 83.1% noted that a very important reason for going to college was “to get a better job” (p. 24). In selecting a specific college, 46.8% said they considered whether the graduates got “good jobs” (p. 25). Boyd suggested that connections between career development and choosing appropriate courses, colleges, majors, and part-time jobs must be made, and that students need to be actively involved in the decision-making process.

Gordon (1994) noted that undecided students have been the subject of research studies for over 50 years and that many studies in the 1950s and 1960s tried to determine how undecided students were different from decided ones. She pointed out that when studying undecided students, many variables have been examined--such as abilities, values, anxiety, risk-taking, interest patterns, and parents' socioeconomic level--but that interestingly, few clear differences have emerged. Appel, Haak, and Witzke (as cited in Gordon, 1994) noted that a few characteristics that seemed to consistently describe undecided students were identity concerns, feelings of anxiety, a data-seeking orientation, multiplicity of interests, and a humanitarian orientation. Professionals have assumed that if these differences were known, various types of interventions could be developed.

According to Gordon, long term benefits will be realized when high school students enter college or the work force with a deeper sense of personal knowledge, a better grasp of educational options, and a more realistic appraisal of the world of work. She claimed that both students and their parents will view being undecided (in most cases) as a positive rather than a negative state and that students will not feel as pressured to decide before they are ready and will feel confident in the exploration process by using the excellent resources available to assist them in making stable and satisfying career decisions.

Karen Taylor (1982) recognized that vocational indecision has been the focus of increasing attention in the field of vocational psychology. Interest in the undecided student has resulted in part from two emerging trends: (1) the incidence of vocational indecision among high school and college students has been increasing,

and (2) undecided students seeking help with vocational decisions comprise a large part of the clientele of most university counseling centers.

Simms (1983) supported the view that undecided students are attrition-prone by stating that academic indecision is one of the common reasons students leave college prior to graduation. He suggested that the belief that selecting a major and narrowing a career direction serve as the sorts of symbolic motivators which form a sound basis for the academic success of the students. Without selecting a major and narrowing the career focus, academic success becomes far less likely, and the lack of a clear academic and career focus is a causal factor in increased attrition.

Lewallen (1993) supported the belief that undecided students are attrition-prone and claimed that widespread acceptance of this belief has garnered national attention. In February of 1992, a national conference was held that focused on undecided students. The title of the conference was *Retention Showcase: Focus on the Undecided Student*, and its theme was that undecided students need to be targeted for retention approaches because they are attrition-prone. Legislation was passed in California (the Matriculation Act of 1986) to mandate that California Community Colleges give special emphasis to identifying and assisting attrition-prone groups of students, which include undecided students. This act resulted in the expenditure of almost \$90 million through 1990-91 and the creation of 798 full-time equivalent positions.

Titley and Titley (1985) presented further support for the relationship between career indecision and attrition. In their study of undecided students at Colorado State University, they found that students who had applied for and matriculated in a

designated but broad area of study but did not select a specific major had an attrition rate of 46%, not significantly different from that of students who selected specific majors. The attrition rates of the two remaining groups of indecisive, or undecided, students was significantly and alarmingly higher. After 6 years, 57% of those who switched majors during orientation and 61% of those who applied for and matriculated in the broad category of general studies never graduated and were no longer on the rolls.

Bean (1990) echoed the findings of Simms (1983), Lewallen (1993), and Titley and Titley (1985). He recognized that although retention is a complex issue involving many factors, one fairly constant finding is that students leave school because they do not fit in. He pointed out that they may not fit in socially or academically or religiously or economically or for some other reasons, and they leave because the school is not a good match for their needs. Heinzen and Rakes (1995) followed up on this idea by suggesting that career services can contribute to students' social and academic fit by helping them become more certain about their academic majors and career direction.

Boyd, Hunt, Stanley, Magoon, and VanBrundt (1997) provided further support for the relationship between career decision-making and retention. They recognized that career clarity in undergraduate students has been shown to be related to retention and graduation. Their study of retention rates related to academic performance shows that students in the treatment group who were in good academic standing and used a career testing and interpretation intervention involving the Strong Interest Inventory had higher rates of retention than the comparison group on

both outcome measures for four semesters after the semester of intervention. These findings point to the importance of career decision-making early in the college experience.

Hartman and Fuqua (1983) cautioned that many students presenting themselves as undecided are engaged in necessary developmental tasks, but considering the significantly higher attrition rate for undecided as opposed to decided college students, counselors should not routinely accept or encourage a student's tentativeness. They claimed that what is needed is some practical way to distinguish students who are exploring alternatives from those students who may be chronically undecided due to a more serious psychological dysfunction of which indecision is merely symptomatic.

Orndorff and Herr (1996) reported that current research indicates that the need for career planning and placement assistance among college students has become extremely comprehensive and intense. They recognized that students continue to report that a primary purpose for attending college is to prepare for a career but that they need professional help to do so.

Orndorff and Herr (1996) reported that 50% to 80% of the 1,625 students they studied at the University of Georgia desired assistance with a variety of career issues and concerns. This percentage of career needs was greater than that of students who wanted assistance with either academic or personal concerns. They found that over 220,000 entering college freshmen from colleges across the United States in 1993 stated that the number one reason noted as very important in deciding

to go to college was to be able to get a better job, and 72% expressed an interest in learning how to prepare for their careers.

Bertram (1996) noted that abundant anecdotal evidence suggests that many students decide upon a major by mere chance, represented by familiar clichés: “I trusted my gut;” “I did what felt right”; or “I followed a hunch” (p. 19). He recognized that research indicates that most students with declared majors acknowledge some level of uncertainty or tentativeness. Bertram pointed out that deciding on a major requires one to think for oneself about oneself, and that this is a significant challenge since most college students have just started making sense out of their lives. He claimed that deciding on a major may demand a developmental stage which some students have not yet reached.

An interesting contrast to the research presented on the need for attention to career decision-making was made by Anderson, Creamer and Cross (1989). They questioned the impression that undecidedness represents a problem for the student. They claimed that undecided students are no different from other students, but they did provide recognition of studies which support the premise that differences do exist between undecided and decided students. In their study they tracked students for four years from the time of admission through graduation on demographic and performance characteristics and found that multiple major changers were the most persistent students (71% persisted for four years) and had the highest graduation rate (54%), while decided students were the least persistent (33%) and had the lowest graduation rate (23%). Their study concluded that students who changed majors demonstrated greater staying power than those who did not. They claimed that the

condition or state of undecidedness about major upon initial enrollment in higher education did not signal “problems ahead” for these students, at least on the academic performance variables included in their study.

Theoretical Bases for Career Decision-Making

Super’s (1980) self concept theory is among the most researched of all theories of career decision-making. His theory posits that career choices are implementations of attempts to actualize the skills, talents, and interests reflective of one’s self concept and are based on the completion of developmentally appropriate vocational tasks between the ages of 15 and 25 years. He claimed that stability of the self concept, evidenced by crystallizing (ages 14 to 18), specifying (ages 18 to 21), and implementing (ages 21 to 24) career choices, provides resilience in the face of external influences and facilitates the internalization of coherent goals and values in the career domain.

Gianakos (1999) explained that Super clarified four career patterns reflecting the influence of self concept and completion of appropriate exploratory tasks. These patterns are as follows: stable, in which a career was chosen and entered both early and permanently; multiple trial, which involved moving from one stable career path to another; conventional, involving experimentation with more than one choice before selecting a permanent one; and unstable, involving a series of trial career choices with no ideas of permanency.

Chickering (1969) noted that when viewed from a developmental perspective, being undecided for most students is a perfectly normal phenomenon. There are developmental tasks that all students need to accomplish if they are to

move confidently into adulthood. He claimed that there is a directionality and timing to these tasks that have great influence on when students can be expected to make academic and career choices and that clarifying purposes and developing integrity are critical to career decision making. He explained that career aspirations and plans are very much affected by students' abilities to identify appropriate lifestyles and that identifying and accepting one's values are also necessary in formulating a personally relevant career identity. Chickering concluded that it would seem that very few college freshmen are developmentally capable of assuming many of the responsibilities for making career decisions that they infer are imposed upon them by parents, peers or society. He felt that some students are ready to make career choices at 18, but that most are not.

Miller (2002) presented a concise summary of one of the most popular career development theorists, John Holland. He explained that in Holland's typology, both personality and environment are expressed in 3-letter codes. A 3-letter code is formed by selecting from Holland's six types the three types that most closely characterize the person or his or her work-school environment. The 3-letter code provides a brief summary of what a person is like by showing the degree of resemblance to three occupational groups. Individuals are assumed to be most satisfied, successful, and stable in work environments that are congruent with their personality types. Two of Holland's basic assumptions are that (a) individuals in the same vocation have similar personalities, and (b) persons tend to choose actual occupational environments (or college majors) that are consistent with their

personality orientations. Miller noted that Holland's theory has received favorable reviews over the past 25 years.

Holland (1996) suggested that most persons have a personal career theory (PCT) about careers or work, which can range from weak and invalid to strong and valid. A PCT is the collection of beliefs, ideas, assumptions, and knowledge that guides individuals as they choose occupations or fields of study, explains why they persist in them, and is used by people as they go about making career decisions. Holland noted that career choice problems may stem from any one or more of three components of the PCT: (1) personal characteristics, (2) occupational knowledge, or (3) translation units. For example, persons having a PCT with a weak translation unit (i.e., poor decision-making skills) or pervasive weaknesses (many negative career thoughts or low vocational identity) require more intensive career assistance. From Holland's perspective, the PCT is fundamentally a matching system, probably developed informally over a lifetime. Holland viewed most PCTs as having elements of the RIASEC typology, e.g., personal characteristics related to occupational structures, as well as beliefs and strategies for achieving work and non-work aspirations that flow from a special life history. Holland's theoretical formulation defines vocational identity as "the possession of a clear and stable picture of one's goals, interests, and talents" (p. 399).

Miller (1994) used an inverse method to assess the validity of Holland's theory. In his study he examined the degree of congruence between participants' least-characteristic Holland types and their stated least desirable college major. The results of his study support Holland's theory as many undecided clients enter into

career counseling confused about which specific college majors they may find potentially desirable. He explained that on the other hand, many of these same clients possess a much clearer idea about which majors they might find undesirable. Miller suggested that career counselors who use Holland's theory might do well to include the idea that students tend to be attracted to (and reject) college majors that are similar (or dissimilar) to their personalities. According to this approach, there is value in having undecided students narrow down their selection of a college major by first eliminating undesirable majors.

Miller (2002) conducted another study on Holland's theory of personality types and occupational environments to determine if there had been, over time, important changes in the 3-letter Holland code. In his case study, he tracked the changes in a single client's Holland code over a 10-year period at 2-year intervals. His data suggested the relative stability of a Holland 3-letter code over time. His subject's 3-letter code at 16 years was identical to his 3-letter code at age 26, although changes in the raw scores and some permutations of the code did occur over time. He noted that of particular importance was that the first letter in the code remained consistent over the 10-year period. He felt that the relative consistency of one's 3-letter code over time speaks directly to the validity (i.e., predictability) of Holland's theory.

The social influence approach is another theory with implications for career counseling. Dorn (1987) recognized that although the research on social influence theory is extensive, a thorough review of the literature revealed only four studies that included the issue of careers in the methodology. Strong (1982) explained that a

major theme in social influence theory as it relates to counseling is that clients are in a static state of behavior because they attribute their difficulties to factors that are beyond their control. Therefore, the main task facing the counselor who is working within a social influence framework is to encourage clients to reattribute their difficulties to factors that are within their control. Forsyth and Forsyth (1982) demonstrated that clients are more motivated about reattributing difficulties when they sense they are also in control of their own circumstances. The results of Dorn's study support the use of social influence principles in the context of career counseling in a group.

Gordon, Coscarelli, and Sears (1986) offered explanations of four additional theories of decision making: Johnson's theory of individual styles in decision making, Harren's four-stage sequential process, Kolb's learning style theory, and Jung's theory as it relates to decision-making. The basis of Johnson's theory is that information can be gathered in either a systematic or spontaneous manner and that this information will be analyzed either internally or externally. Coscarelli (as cited in Gordon et al., 1986) elaborated on these processes, which are referred to as systematic, spontaneous, external, and internal. He explained that Harren's concept of career decision-making style involves a 4-stage sequential process students use regarding decisions about college major and occupational choice. Harren's styles are rational, intuitive, and dependent. Additionally, he noted that Kolb's theory of learning styles is rooted in Jungian and experiential learning theory. Learning is seen as a 4-stage cycle beginning with concrete experience, which serves as the basis of observation and reflection, and, in turn, leads to the formation of abstract concepts

and generalizations that can be implemented and tested. Kolb's learning modes are concrete experience, reflective observation, abstract conceptualization, and active experimentation. He further explained that Jung's theory helps to explain why people approach the same decisions differently. The Myers-Briggs Type Indicator is based on Jung's theory and measures the manner in which different types of people acquire and process the information needed to make decisions. Eight indicators are used to develop the 16 personality types; each type has observably different characteristics regarding the way he or she views the world and makes decisions.

Bergeron and Romano (1994) noted that Bandura's theory of self-efficacy to understand career choice behavior has received much attention in the career development literature. Taylor and Popma (as cited in Bergeron & Romano, 1994) conducted a study that found career decision-making self-efficacy to be the only significant predictor of vocational indecision in college students. Taylor and Popma's study also found that people with lower levels of confidence in their ability to make effective decisions regarding career choice reported higher levels of vocational indecision. Bergeron and Romano's study suggested a moderately strong relationship between career decision-making/self-efficacy and vocational indecision/college major indecision.

Another theory of career decision-making is Tversky's elimination-by-aspects theory of choice. Gati (1986) based his Sequential Elimination Model (SEM) on this theory which views each occupational alternative as a set of aspects or characteristics. The aspects represent levels on some quantitative or qualitative dimension (e.g., an expected salary of at least \$30,000 or high prestige) or are binary

attributes for the alternatives (e.g., requiring or not requiring a college degree). At any stage of the elimination process, an aspect is selected according to its relative importance. The selection of a desirable aspect leads to the elimination of all the alternatives that lack that aspect. The process continues until only a few alternatives, or one single alternative, remain. Gati pointed out that recent theoretical approaches have emphasized vocational development rather than occupational choice.

In another study, Gati (1998) explored the notion of career-related aspects as a potential framework for career decision-making and for assessing person-environment fit. He found that the aspects-based approach emerged in the context of the development of a computer-assisted guidance system that stemmed from the need to facilitate the career decision-making process of young adults in Israel. In his study he reviewed the aspects-based approach to person-environment fit and career decision-making and proposed that it may have some merit as a new approach. He claimed that the aspects-based approach provides a general framework which may be used in various types of career decisions, including the search for occupations, jobs, and even leisure activities.

Characteristics of Undecided Students

Research to date on vocational indecision has focused primarily on identifying factors which differentiate vocationally-decided from vocationally-undecided students. In general, the investigation of ability and personality characteristics as possible differentiating factors has been central in this area of research (Taylor, 1982). Taylor's research found descriptions of undecided students as more anxious, as more dependent, and as more dogmatic than the decided student.

Taylor characterized the undecided student as evidencing a lower estimate of self-esteem and recognized they have lower high school and college grade point averages. She suggested that they are less likely to remain in college and achieve academic success than the decided students.

Taylor noted that the existence of conflicting and thus inconclusive research findings may in part be due to an assumption by researchers that the causes of indecision are similar for all undecided students: undecided individuals are assumed to represent a population homogeneous on certain key explanatory dimensions. She suggested that it may be, however, that the causes and/or correlates of vocational indecision are different for different individuals.

Mau and Jepson (1992) recognized two personal characteristics of college students that may influence their approach to the specific decision-making situation of choosing a college major: (a) decision-making stages, the person's position along a developmental continuum of the decision processes, and (b) decision-making style, the person's characteristic mode of perceiving and responding to decision-making tasks. Through their study they found several significant interaction effects for using certain strategies with students who have a predominantly rational style.

Larson, Heppner, Ham, and Dugan (1988) reported that researchers have turned their attention to the relation of career indecision to a host of personality variables such as anxiety, vocational identity, career decision-making styles, and perceptions of problem solving. They found that when compared with the decided students, the undecided students acknowledged (a) more career problem-solving deficits, (b) more career myths, (c) more pressure to make a career decision, (d) less

confidence in their ability to perform academically, (e) lower knowledge of the world of work, and (f) more career obstacles. Their research indicates that the decided and undecided students participating in the study appeared to be quite different on a broad range of career-planning behaviors and cognitions and that more differences in personality and career planning variables appear between these two groups.

Other characteristics of undecided students are related to the roles of identity formation and parental relationship factors, as studied by Guerra and Braungart-Reiker (1999). They suggested that counselors explore aspects of the parental relationship, particularly the area of autonomy, to uncover dynamics that may be hindering the decision process with their students who are experiencing difficulty selecting a career or major. They advised counselors to encourage students to not only investigate areas in their lives specifically related to academic major or career options, but also to seek out their interests in other domains, such as interpersonal relationships and politics, that are related to identity formation.

Another characteristic related to career decision-making that has been investigated in the research is time perspective. Savickas, Silling, and Schwartz (1984) recognized Super's concept of the time perspective as a prime variable in vocational maturity and career decision-making. Super (as cited in Savickas et al., 1984) formulated a developmental model of vocational maturity that contains planfulness or time perspective and includes three components: autonomy, time perspective, and self-esteem. Jepsen (as cited in Savickas et al., 1984) used time segments to identify 12 vocational decision-making strategy types or "patterns

inherent in the way adolescents organize information about themselves and vocational options” (p. 18). In their own work, Savickas, et al. concluded that time perspective is a component in attitudinal vocational maturity and career decision-making. They claimed that the lack of future structure is a developmental antecedent of vocational indecision and that pessimism is a part of immature attitudes toward planning.

Self-efficacy is a characteristic that has been studied extensively in relation to career decision-making. Bandura (1982) believed that persons who do persist in their chosen fields, even in the face of obstacles or environmental pressures, have strong self-efficacy beliefs in their career decision-making capabilities. Holland (as cited in Bandura, 1982) suggested that individuals whose career choice histories reflect unstable or uncommitted patterns likely have lowered beliefs in career decision-making self-efficacy, given that a diffuse sense of self-identity interferes with selecting a congruent, and therefore more satisfying, work environment. Gianakos (1999) reported as a result of her study that empirical support exists for the hypothesis that career choice patterns are associated with differences in career decision-making self-efficacy. She found that persons with stable and multiple trial patterns, compared to those persons with conventional and unstable patterns, reported significantly greater confidence in their abilities to successfully undertake the career-related tasks of goal selection, gathering occupational information, problem-solving, realistic planning, and self-appraisal.

Harris, Golden and Olson (1985) found that similarities exist among undecided college students, such as (a) an unclear sense of identity and self-

knowledge, (b) poor decision-making skills, (c) a lack of information regarding careers and major areas of study, and (d) a lack of information-seeking skills. The goals of a decision-making workshop they developed were to increase the self-awareness, self-knowledge, and self-efficacy of workshop participants and to help them identify a major area of study.

Meier (1991) recognized four major sources of career indecision: (a) lack of self-information, (b) lack of information relevant to the current organization, (c) decision-making fear and anxiety, and (d) situational constraints. He found that trait-anxious individuals experienced more difficulty with decision-making and that indecision was associated with greater life stress. Phillips and Bruch (as cited in Meier, 1991) found that both male and female shy students were more likely to be undecided. Shy students were also less likely to express interest in occupational areas requiring interpersonal skills and were engaged in fewer information-seeking behaviors. Schumruma and Hartman (as cited in Meier, 1991) suggested that adult children of alcoholics may possess personality traits that may make them susceptible to career indecision. Kinnier, Brigman, and Noble (as cited in Meier, 1991) found that students who had stronger relationships with their families were more undecided. Finally, studies by Pask-McCartney and Salomone (as cited in Meier, 1991) suggested that possessing interests and competencies may be a source of career indecision.

Styles and Types of Career Indecision

Gordon (1995b) explained that in the last decade, useful research on the undecided student has concentrated on trying to find subgroups of students with

common characteristics so that specific types of programs and services might be more focused to meet their needs. She recognized that although this research has a long way to go, it is useful to identify the multiple subtypes of undecided students on individual campuses in order to tailor educational and career-related interventions to help them become more focused.

Arroba (1977) defined decision-making styles as “ways of approaching, responding to, and acting in decision-making situations” (p. 151). Niles, Erford, and Hunt (1997) recognized significant and positive relationships between the systematic decision-making style and career maturity, career decidedness, career implementation, and the possession of a stable ego identity status. In their study, Niles, et al. (1997) identified subgroups of college students based on their decision-making styles, career decision-making self-efficacy, and career development accomplishment. The results provide support for the positive relationship between systematic decision-making style and adaptive vocational behavior. They suggested that when designing programs to enhance student development, career development practitioners and student affairs professionals may want to consider how students gather and process information to make decisions.

Paul Salomone (1982) made an important distinction between vocationally undecided and vocationally indecisive students. He claimed that the state of being undecided is a normal, common occurrence for college youth pondering educational majors. Most often a person is undecided because not enough information has been gathered to allow for a sound and confident decision. Holland and Holland (1977) noted that a large proportion of undecided students are doing what intelligent adults

do--delaying some decisions until reality arrives. They felt that such a strategy is “not necessarily stupid, uninformed, or immature” (p. 408). Like Crites, they suggested multiple types of undecided persons. Zytowski (1977) identified three types of undecided persons as suggested by Holland and Holland as: (1) a group which simply doesn’t have to decide yet, and so stays undecided; (2) a group which is mildly anxious, immature, or incompetent; and (3) a final group which might be described as having a disposition toward indecisiveness.

Salomone (1982) contrasted undecided and indecisive students. He noted that indecisive students are those who fail to make important decisions not because they lack sufficient information, but because they have personal qualities that will not allow them to reach a decisional state of mind and take a course of action. He believed that they cannot make critical decisions because they are psychologically incapable of such behaviors. Salomone noted that probably all college freshmen experience some moments of uncertainty, ambivalence, and psychological shakiness, but that most college youth have a fairly good sense of ego identity and are thus able to make appropriate vocational decisions. Persons without a clear sense of identity may not just be undecided about vocational goals but, instead, may not understand who they are or how they fit into society. These persons are best described as indecisive individuals, not as undecided persons.

Lucas and Epperson (1988) recognized that vocational indecision may not necessarily be a unitary trait and that there are additional styles of undecided students. They conducted research which suggested it is appropriate to consider undecided students as made up of multiple subtypes. They grouped students into

five different clusters based on the styles of decision-making: (1) Cluster 1: well adjusted; (2) Cluster 2: caught in a dilemma; (3) Cluster 3: undecided and limited interests; (4) Cluster 4: anxious and unclear on goals; and (5) Cluster 5: happy and playful. Their research showed that for each of these types, certain interventions are more appropriate and effective.

Much of the research reviewed by Gordon (1998) reflects either directly or indirectly the tenets of adolescent and adult developmental theory, including psychosocial and career development and decision-making theory. For example, Savickas and Jarjoura (as cited in Gordon, 1998) based three of their subtypes on the developmental tasks that college students use during what Super termed the “exploration stage.” They reported three distinctive groups who were either “implementing,” “specifying,” or “crystallizing” a vocational choice. (p. 387) Lucas and Epperson (1990) used Chickering’s developmental vectors to characterize their subtypes. Cohen, Chartrand, and Jowdy (1995) reported four career-decision subtypes related to Erikson’s ego identity development stages.

Gordon (1998) explained that a thorough search of the literature from 1977 to 1996 yielded 15 studies on multiple subtypes. Although the idea of multiple subtypes had been mentioned in the literature previously, two studies in the 1970s set the stage for pursuing this course of inquiry. Holland and Holland (1977) reported three types of undecided students. The first seemed to be delaying a decision until “reality arrived” (p. 409). The second group was slightly immature, anxious, interpersonally incompetent, and alienated. The third group of undecided students displayed the same characteristics as the second group, yet to a greater degree.

Gordon (1998) recognized that as many advisors and counselors have witnessed, many so-called decided students need as much assistance with academic and career planning as the admittedly undecided students. From the 15 studies she reviewed, she extrapolated three general categories of decided-type students and four categories of undecided types and used a decided-undecided continuum to organize the types. The decision statuses that seem to emerge from this literature are the following: very decided, somewhat decided, unstable decided, tentatively undecided, developmentally undecided, seriously undecided, and chronically indecisive. Gordon's work is significant in that she recognized that when career counselors work with students who are in the process of making educational and career decisions, the etiology and severity of their concerns and their diverse personal characteristics will influence the type and effectiveness of the counsel offered.

In a review of literature on vocational behavior that covered a 3-year period from 1988-1990, Meier (1991) found much research devoted to different types of undecided students along psychological and vocational dimensions. Lucas and Epperson (1990) developed five clusters of indecision and found that most indecisive students are included in the first three clusters: (a) high on anxiety, low on self-esteem, and with external locus of control; (b) low on anxiety, high on self-esteem, with internal locus of control, and in need of occupational information; (c) attempt to juggle interests in relationships, work, and leisure activities.

Larson, Heppner, Ham, and Dugan (1998) identified four types of career indecision: (a) planless avoiders, (b) informed decisives, (c) confident but uninformed, and (d) uninformed. Additional studies by Fuqua, Blum, and Hartman

(as cited in Meier, 1991) found evidence for four types of undecided students: (a) those who are career-decided, relatively free of anxiety; (b) those with moderate career indecision, some anxiety, internal locus of control; (c) those with serious career indecision, moderate anxiety, external locus of control; and (d) those with serious career indecision, excessive anxiety, external locus of control.

Mau (1995) studied the rational decision-making style as related to the career decision-making status and treatment gains based on a computer-based career intervention. She defined rational decision-making style as characterized by making decisions deliberately, systematically, and logically. The results of her study indicate that employing decision-making strategies based on an individual's preference significantly increased students' career decidedness and decreased career indecision, choice anxiety, and reason complexity. She found that the rational decision-making style is positively associated with career decidedness and negatively associated with the exploration stage of decision-making, but it is not predictive of treatment gains.

Strategies and Interventions for Career Decision-Making

Oliver and Spokane (1988) defined career interventions as any treatment or effort intended to enhance an individual's career development or to enable the person to make better career-related decisions. This broad definition encompasses a wide range of interventions, such as individual counseling, group activities, computer applications, and self-administered inventories. Whiston, Sexton, and Lasoff (1988) recognized two meta-analyses by Oliver and Spokane (1988) and Spokane and Oliver (1983) as indicators of the effectiveness of career interventions.

The first study included career intervention studies published between 1950 and 1979; the second study extended the range by including studies published through 1982. Whiston, et al. used the same criteria consistent with these meta-analyses to review studies published between 1983 and 1995. Their analyses indicated that career interventions are effective with most age groups and that career interventions are not a homogenous group of activities producing a homogeneous effect. Their results also indicated that individual counseling is the most effective treatment modality and produces the most gain per hour or session; however, it is the most expensive intervention. They found that computer interventions are least expensive but are not as efficient or as effective. They pointed out that there may be effective methods of combining individual career counseling and computer applications.

Career assessment is among the most popular career interventions used by career counselors with individuals in the process of career decision-making. Chartrand and Walsh (2001) pointed out that although career assessment can be defined in different ways, most authors agree that assessment is a process used for counseling or selection and that its purpose is to provide information. They recognized that the purpose of career instruments, such as interest inventories, is to facilitate career development or informed career decision-making. Spokane (1991) referred to career assessment as unearthing congruent career possibilities, discovering leading-edge interests, confirming congruence, assessing conflicts or problems, motivating constructive behavior, acquiring a cognitive structure for evaluating career alternatives, clarifying expectations, planning interventions, and

establishing ability range. He noted that career instruments are the measurement component of research, and as such, they play an important role in furthering our understanding of career development and decision-making.

The literature on computer-assisted career interventions is mounting at an extraordinarily fast pace. Mary Beth Muskin (1998) pointed out that in the current computer age, children as well as adults are increasingly turning to the Web as a resource and that the Web has a wide array of information sources that counselors and students can choose from, depending on their goals. She advised that when using career assessments it is important to look for the sites that share research that has been done to support their assessment, reliability and validity information. Once the client has developed career goals, the Web offers opportunities for research and networking in specific career areas. She advised that using the Web to assist students with an understanding of how to access career information creates the opportunity for the development of life skills that will benefit the student.

According to Mau (1999), the use of computer technology for career counseling has become a standardized practice among counseling professionals since its first introduction to the field. However, the effectiveness of computer-assisted career guidance systems has not been systematically investigated as has other traditional career interventions. Jepson (1984) noted that while these systems vary greatly in the amount of validity and reliability data available, they provide many attractive features for experimental research on career decision-making, largely due to the standardization of treatment product and replicability of results.

O'Halloran, Fahr, and Keller (2002) commented on the vast number and variety of Web sites and issues involved in infusing the Internet into career counseling and recognized that the introduction of the Internet as an adjunct to the traditional counseling tools adds another curve to the career counseling process. They cautioned that Web sites used in career counseling need to be selected in a planful fashion and that using the Internet effectively in counseling does require some training and practice. After reviewing the ethical guidelines (NCDA, 1997) for using assessments, they viewed many of the online assessments available as "under construction" and potentially hazardous.

Sampson, Peterson, and Reardon (1989) pointed out that most of the computer-assisted career guidance systems are designed to assist individuals in learning about themselves (i.e., career exploration approach). Very few systems are designed to teach individuals about how to process career information (i.e., decision-making approach). They suggested that if the ultimate goal of career intervention is to help individuals become independent and responsible career problem-solvers and decision-makers, then the teaching of information processing skills and decision-making strategies must be developed.

While Mau (1999) noted that very few studies have investigated the effectiveness of teaching career decision-making via computer, she recognized the efficiency of using microcomputers to teach the steps in the decision-making process and to help students learn how to use personal interests, values, and abilities to evaluate career options. Johnson (as cited in Mau, 1999) conducted a study and

found that students in the computer-assisted group perceived the career exploration to be more enjoyable and helpful than did students in the counselor-assisted group.

Salters (1985) conducted a study of the effect of SIGI (System of Interactive Guidance and Information) developed for Educational Testing Service by Dr. Martin Katz. He found that SIGI can be a useful adjunct to career counseling with undecided freshman students. In institutions of higher education where resources for personnel are increasingly scarce, it is reasonable to look at SIGI as a legitimate tool to use with the large number of undecided students. This researcher suggested that students could be screened in an intake session by a counselor, then referred to SIGI, and then to post-treatment sessions with the counselor as a way of serving larger numbers of students.

Niles and Garis (1990) found that a combination of a career planning course and SIGI-PLUS outperformed SIGI-PLUS alone on a measure of career indecision. Meier (1991) found contrasting results reported in a study conducted by Garis and Niles (1990) in which they found that SIGI and DISCOVER had effects equivalent to a career planning course on measures of self-awareness, confidence, decision-making skills, and indecision. The addition of the computer programs did not augment the effects of the course alone. Roselle and Hummel (as cited in Meier, 1991) found that more intellectually developed students used DISCOVER as one tool in the career decision-making process, while less intellectually developed students hoped the computer would tell them what decision to make.

Eveland, Conyne, and Blakney (1998) conducted a study focused on the effectiveness of two career guidance interventions, a counselor-plus-computer and

computer-only intervention. They investigated their effectiveness in increasing the level of career decidedness in a sample of university students presenting for career guidance services at the Career Development and Placement Center of a major midwestern university. The results of the study indicated that both a computer-only (DISCOVER) and a counselor-plus-computer intervention were effective in significantly increasing the level of career decidedness in the sample population as compared with a delayed treatment control group. The counselor-plus-computer interventions, however, proved to be the more beneficial intervention for increasing the level of career decidedness in the sample. Studies such as this one confirm the positive results of computer-assisted programs on career decision-making by college students.

Sampson and Reardon (1998) suggested three levels of career intervention that might follow a brief assessment of readiness for career assistance. Their suggestions include (1) individual case-managed intervention (e.g., counseling by appointment), (2) brief staff-assisted intervention (e.g., workshops, career advising and consultation), and (3) self-help interventions (e.g., Internet, self-help materials). They suggested that the advent of the Internet, computer-based guidance systems, and other self-help career interventions may find higher rates of success if assessment activities are incorporated into these interventions for use directly by clients or customers. They explained that this may mean taking the secondary constructs of Holland's theory and simplifying them for use by persons who do not have professional training in career counseling.

In a review of the vocational behavior literature between 1988 and 1990, Meier (1991) found considerable interest and excitement in the combination of vocational assessment and microcomputers. McKee and Levinson (as cited in Meier, 1991) noted that some users take the results of computer-assisted testing too seriously, as if computerizing the test automatically raised its validity. Reardon and Loughead (as cited in Meier, 1991) compared the paper-and-pencil and computer versions of the Self Directed Search and found that both versions were highly correlated and demonstrated similar patterns of gender differences, although the means in the computer version were all slightly higher. Users indicated that they preferred the computer version.

In a pilot study Austin and Mahlman (2000) conducted on the use of the Internet for career assessment, they found that Internet vocational testing performs comparably and is preferred by students over the traditional paper-pencil format and that its usage appears to be efficient and effective. They suggested that the advantages of Internet testing outweigh the disadvantages and that continued experimentation with this medium will create improvements that resolve potential problems.

Jones, Harbach, Coker, and Staples (2002) also conducted a study on Web-assisted vocational test interpretation. Their study compared its effectiveness across three delivery modalities: (a) online text chat; (b) online text chat with video cues; and (c) traditional, face-to-face interpretation. The results of their study provide tentative support for online delivery of vocational test interpretation, but they caution

that before a major paradigm shift is warranted, additional research support is needed.

Doolittle (1981) reported that at The University of Iowa a special advising program for students who are undecided about their major field of study was developed. In this program, undecided students were assigned to specially trained, academic advisors who were able to give them more attention than undecided students had received in the past. Three criteria were used to evaluate the advising program: first-semester dropout rate, first-year dropout rate, and first semester GPA. Results of the study indicated that first-year dropout rate as the criterion was supportive of the program, but analysis with the other criteria were not. Doolittle suggested that second semester GPA as the criterion could shed further light on the effectiveness of the program for high ability, undecided students and that as a post-enrollment intervention by the University, the advising program can have an effect on student performance and/or retention.

Patti Boyd (1988) suggested using a 4-step career decision-making model, consisting of the steps of self-awareness, career information, decision-making, and an action plan. In the first step, students reflect upon themselves and generate self-information about their interests, values, skills and abilities, experiences, and personality characteristics. In the second step, students gather career information, such as the nature of work tasks, salaries, training pathways, employment outlook, work environment, opportunities for advancement, related occupations and how to obtain more information. In the third step, students rate the tentative careers on

aspects related to their self-information. The final step involves developing an action plan to follow in reaching career goals.

Holland (1996) purported that the Self Directed Search (SDS) can be an effective tool for self assessment and noted that first and foremost, the Daydreams Section at the beginning of the Assessment Booklet provides a measure of expressed vocational interest, in contrast to the measured vocational interests provided by the Summary Score of the five sections of the SDS. The SDS is a standardized assessment instrument and includes interpretive information that can help a client interpret and use the summary scores and the 3-letter code. In addition, the Occupations Finder and the You and Your Career booklet provide additional interpretive information to support the Assessment Booklet. Altogether, this trio of booklets encompasses a comprehensive career assessment and intervention program that many clients can use with minimal assistance to further their educational and career planning.

Osipow (1999) recognized Holland's proposal that indecision is the result of difficulties in personal and vocational identity. An instrument My Vocational Situation (MVS) was developed to diagnose problems associated with vocational decision-making. Osipow reported that the Vocational Identity scale measures the clarity of an individual's goals, interests, and talents as they relate to vocational decisions. He explained that the Occupational Information scale allows the counselor to determine where the client's career knowledge is deficient. Using these categories enables the career counselor to develop a treatment plan for intervening in the client's indecision.

At the University of Wisconsin-La Crosse, Korschgen and Hageseth (1997) found that students were spending considerable time and effort choosing and then changing majors and career goals and were often failing to use career decision-making services provided for them. These authors were instrumental in developing the Academic Discovery Lab whose main feature is workstations equipped with computers with the DISCOVER career guidance program and Career Visions, a multimedia career exploration and decision-making program. In its first year of operation, more than 1,200 students used the lab's services and many returned to receive follow-up help. Nearly 40% of users were students who had not declared a major; subsequent research has shown that lab users were more likely to remain in school (84% were still enrolled a year later versus 75% of nonusers) and more likely (38%) to have declared a major than non-lab users (26%). They attributed the success of the lab to the collaborative nature of this effort, an effective promotional campaign to students and faculty, the walk-in nature of the service, and, more importantly, to the fact that it has responded to an important need that previously was not being met.

In a study on the design and delivery of career development interventions, David Blustein (1989) found that interventions that provide encouragement and instruction in exploratory activities are useful in the domain of career decision-making. In addition, interventions that distinguish between environmental and self-exploration might be particularly helpful in facilitating progress through the various phases of career decision-making. He suggested that considering the role of career

exploration from a developmental perspective might be particularly useful in advancing theory and practice in career development.

Zagora and Cramer (1994) came to an important realization about practitioners who prescribe interventions that deal with undecided college students. They suggested that too often little consideration is given to the match between client problem and treatment. They recognized that when all students classified as having career indecision are referred to the same experience, mean scores of the outcomes do not account for differences in individuals. Sepich (1987) criticized this global approach, suggesting that what might be gained in simplicity of conceptualization by viewing a person as either decided or undecided is often lost when one attempts to evaluate specific effects of interventions. In their study, Zagora and Cramer found that involvement in a career workshop with others of similar vocational identity status, whether high or low, results in greater gains in decidedness. Furthermore, they found that similarity in vocational identity status facilitates gains in decidedness after a career workshop and that heterogeneity may impede such progress.

Osipow (1999) echoed Zagora and Cramer's beliefs regarding career indecision. He suggested that whereas indecision is a state that is normal in human development, indecisiveness is not an ordinary part of growth and development, but is, instead, a personal trait which generalizes across situations demanding decisions. He suggested that retrospection is the most common way to determine whether an individual's career uncertainty is indecision or indecisiveness. Osipow along with Winer, Koschier, and Yanico developed The Career Decision Scale in 1975 as an attempt to identify all or as many as possible of the reasons individuals offer to

explain the source of their career indecision. This instrument consists of 16 content items and was developed from an empirical approach rather than a theoretical approach.

Campbell and Cellini (1981) developed The Taxonomy of Adult Career Development Problems as a useful taxonomy that consists of specific statements about the problems people have in major career problem areas. Osipow (1999) explained that the instrument allows the career counselor to differentially diagnose career indecision problems to focus interventions related specifically to an individual's own particular problems.

Another instrument commonly used to assess career indecision is The Career Decision Profile (CDP) developed by Lawrence Jones in 1998. Jones and Lohmann (1998) reported that the CDP, a 16-item inventory, was developed from a 3-dimensional model of career decision status: Decidedness, Comfort, and Reasons. They explained that the instrument can be used by counselors to (a) explore clients' career indecision; (b) screen for readiness; (c) determine the appropriate level of career services needed; and (d) evaluate counseling outcomes. Jones and Lohmann prefer the term career decision status because it is more inclusive; it includes those who are decided as well as those who are not, and it makes no assumption that those who are decided are comfortable or that those who are undecided are uncomfortable.

Fournier and Jeanrie (1999) recognized the importance of locus of control in the career decision-making process and reported on their study to validate the Vocational Locus of Control Scale (VLOC) developed in 1996 by Fournier, Jeanrie, and Drapeau. They pointed out that the adoption of an internal or external locus of

control is likely to determine the motivation of an individual to take or not take responsibility for his/her orientation. The results of their study revealed that the psychometric value of the VLOC is high enough to consider that not only is its future use justified, but that it will contribute to further understanding of the feelings of control young people have about their careers.

One of the most widely used instruments for career decision-making is The Armed Services Vocational Aptitude Battery (ASVAB). According to Baker (2002), the ASVAB Career Exploration Program is one of the largest career exploration programs in the world. He reported that annually it serves between 800,000 and 900,000 high school and postsecondary students in more than 14,000 schools nationwide. One of the attractive features of The ASVAB Program is a comprehensive vocational assessment package provided at no cost to the student or school. Baker explained that the ASVAB Program has undergone considerable and substantial revision since its inception in 1968 and that the current version, fielded in 1992, is a cooperative endeavor between the nation's schools and the Department of Defense.

Baker described the ASVAB Career Exploration Program as a program designed to teach career exploration skills useful both for entry into the workforce and for continued career development. Based on Parson's trait-and-factor approach, the instrument involves the completion of interest, aptitude, and work value measures which lead to exploration of job sets catalogued according to Holland's types. Through the OCCU-FIND exercise, students identify careers that match their own ability, interest, and work value characteristics. The results of Baker's study

suggested that participation in the ASVAB Career Exploration Program lowers certain kinds of career indecision while it increases aspects of career exploration knowledge and thus functions as an age-appropriate career intervention.

Based on an extensive review of the literature related to career decision-making, Krieshok (2001) offered several suggestions for effective interventions. He argued that interventions should be aimed not at forcing a decision, but at enabling clients to create a satisfying life in a changing work environment. Given the rapidity of change in the current economy, it makes less sense to perfectly spell out an individual's skills, interests, and personality, and more sense to teach him or her to be flexible in adapting to change. He recognized that flexibility might include identifying areas as non-interests and trying to develop some interests there, or identifying some areas of low skill and developing new skills in that area. He advised that we need to make students aware that career decidedness is not at all the same thing as career commitment, and he cautioned career counselors about attempting to settle students' anxiety by helping them find a suitable major. While he supported quick assessments, self-scored instruments, and self-help Web offerings, he believed they have the potential to convey that career interventions are quick and simple. He advised that clients need to be converted to a mindset that allows greater probing and much more work on their part.

Bertram (1996) echoed this concern by explaining that an over reliance on computer technology may encourage some students to place the answers to questions above the process necessary to arrive at those answers. This emphasis on product over process discourages reflective thinking; he suggested that computers and related

technologies are very helpful tools, but they do not replace the higher functions of the human brain.

Kivlighan, Johnston, Hogan, and Mauer (1994) reported that individuals with low goal instability were more satisfied with computerized treatments, whereas students with high goal instability were more satisfied with interpersonally-oriented approaches. Gordon (1994) pointed out that a student who is decided yet concerned about an unattainable choice will obviously require a very different approach from that required for one who is seriously undecided and dependent on others.

Harris, Golden, and Olson (1985) designed a decision-making workshop in an attempt to help college students identify a major area of study and increase their self awareness, self-knowledge, and self-efficacy. The workshop included two components; the first was designed to foster group cohesion and to explore the individual student's implicit values, life-theme preferences, and skills and abilities. The second component focused on exploring majors grouped according to Holland's codes, understanding the career decision-making process, and presenting an overview of pertinent information available at the University Career Planning and Placement Center. They found that the greatest changes were in the students' perceived ability to locate career information and to choose an appropriate major or career. The program evaluation results also indicated that students felt more prepared to choose a major as the result of increased awareness of themselves and their goals after participation in the workshop.

A career course at the college level is an intervention that Reed, Lenz, Reardon, and Leierer (2000) found had a positive impact on cognitive factors

associated with career decision-making. Students in their course showed a significant and dramatic reduction in their levels of negative thoughts at the completion of the course, especially those with higher levels of negative thoughts at the beginning of the courses. Students in the Cognitive Information Processing (CIP) theory-based career course reported a decrease in dysfunctional career thoughts in the areas of decision-making confusion, commitment anxiety, and external conflict. Reed, et al. suggested that the reduction of negative career thoughts should enable students to become more successful in career decision-making and choosing a major or occupational goal.

Luzzo and MacGregor's (2001) review of career counseling and development literature published in 2000 included several studies on interventions designed to enhance self-efficacy and career confidence. Several of these studies evaluated the efficacy of career exploration and planning courses, workshops, and group counseling on the career self-efficacy and career confidence of participants. McWhirter, Rasheed, and Crother (2000) investigated the influence of a 9-week career education class on the career decision-making self-efficacy, vocational skills self-efficacy, perceived educational barriers, and outcome expectations among a sample of 166 high school sophomores. Their study found that participants in the course, relative to students in a control group, exhibited increases in career decision-making self-efficacy, in vocational skills self-efficacy, and in short-term goals and outcome expectations.

Greenhaus, Hawkins, and Brenner (1983) studied the relationship of career exploration on the development of a career decision and satisfaction with a career

decision. They found that exploratory behavior facilitates career decision-making. They noted that the popularity of a particular exploratory activity does not necessarily reflect its usefulness to students; therefore it is important to know why certain students are attracted to specific career exploratory activities. They observed that students may choose to participate in the most convenient or comfortable activities (e.g., consulting friends) regardless of their instrumental value.

In a study conducted on early career interventions with undecided students, Buescher, Johnston, Lucas, and Hughey (1989) reported that a one-time early college career intervention can result in a positive change for undecided freshmen. The intervention they used was the Missouri Occupational Card Sort (MOCS) developed by Krieshok, Hansen, and Johnston in 1982, a meeting with a career counselor, and a tour of the college career center. They reported that students who received early intervention were able to develop a clearer and more stable picture of their goals, interests, and skills. They claimed that their study documents the merits of providing a brief career intervention to impact the vocational identity of undecided college students early in their college careers. Of particular note is their belief that given the sheer number of undecided students in college today and the possibility that their persistence and success with an academic career may be related to their vocational identity, an early intervention that proves successful deserves attention.

Jurgens (1986) supported the importance of early career interventions. The findings of a study she conducted on a comparison of a 4-phase and a 2-phase combined intervention on career certainty, career indecision, and client satisfaction in undecided college students indicated that both interventions were effective in

increasing career certainty in the sample population; however, the 4-phase treatment was significantly more effective in increasing career certainty. There was no significant difference in the levels of satisfaction reported by the two groups. As Jurgens noted, these findings echoed previous studies that confirmed that comprehensive programs and shorter term interventions can be effective in reducing career indecision and increasing career certainty. She suggested that interventions can be customized to fit the needs of an agency or organization and that even the most basic, cost-effective intervention may offer some relief to the undecided individual.

Schein (1997) developed a hands-on strategy for working with undecided students about their choice of major and career. Based on the conceptual model *The Myth of the Academic Major*, the strategy helps students develop a research model for conceptualizing the use of their colleges or universities. Students assume a center role in their academic planning processes, which is different from the traditional approach to major choosing in which the planning centers around the institution. The scheme involves a hands-on, time-limited method for using students' self descriptions, rather than the institution's structure (e.g., lists of curricula) as the starting point for dialog that points students in academic directions. Students complete an exercise as Step 1 of the process, *Having a Major Fit You—Not You Fitting a Major*. The idea is for the student to create an area that suits his/her intellectual, personal, and career goals, and then to select the course and noncourse experiences that help achieve this objective. Following a 3-step process requires students to play an active role in Step 1 and an interactive role with advisors

in Steps 2 and 3. Schein claimed that the major, as developed in this scheme, has the potential to be more personally conceptualized and better understood by students than in instances where majors are merely chosen from the plate of choices presented by the course catalog.

A career intervention exercise with similarities to Schein's strategy was presented by Laker (2002). As with Schein's model, students assume an active role in the career exploration process. Laker's approach involves the Career Wheel exercise and starts with the assumption that most students are rarely informed consumers about their intended careers. Laker explained that the exercise's primary purpose is to provide students with a systematic plan to explore the careers in which they are presently interested by providing a way for them to validate or invalidate their beliefs and assumptions about the careers they are actively contemplating. Students begin the exercise by identifying several careers or jobs of interest, and then they state their beliefs, assumptions, and uncertainties about them. Next, they translate the beliefs, assumptions, and uncertainties into questions and choose individuals to interview. Through informational interviewing, students compare their beliefs, assumptions, and uncertainties they had before the interviews with what they have learned as a result of their interviews and adjust their career plans accordingly. Laker claimed that over the years, both undergraduate and graduate students have almost universally found the Career Wheel exercise to be extremely beneficial.

In reflecting on the significant role career interventions have historically played in counseling psychology and research, Whiston (2002) advised that the

evaluation of the empirical support for career interventions is important because of clients' needs for effective career counseling. She reported that the Principles of Empirically Supported Interventions (PESI) developed by Wampold, Lichtenberg, and Waehler provide a systematic scheme for evaluating the efficacy of interventions and furnish a framework for evaluating the effectiveness of career interventions. She used the PESI to determine if career interventions meet the criteria for empirically supported intervention and found that applying these principles to career interventions results in conclusions that career interventions are generally effective, and individual career counseling and career classes may be the most effective methods for providing career interventions. She recommended more outcome research in the career area, particularly in terms of teaming process and outcome research. She cautioned that without renewed interest in career counseling outcome research, career counseling may miss being considered an empirically supported psychological intervention. Additionally, she recommended that more attention needs to be given to client attributes by treatment interactions to determine which career treatments are effective with which clients.

Levinson, Ohler, Caswell, and Kiewra (1998) provided excellent advice on the use of career interventions. They suggested that best practices for counselors involve responsible decisions about when to use career assessment instruments and about which instrument is best suited for use in a particular counseling situation. They noted that career assessment has historically been a fundamental tool of the counselor and that the notion of comprehensive career guidance embraces familiarity with a broad repertoire of assessment strategies which are increasingly differentiated

by setting and populations. They advised that when selecting an inventory for use, professionals should consider the instrument's psychometric properties, cost, administration time, reading level, and scoring options.

Summary

The body of knowledge related to career decision-making in college students constructed over the past 30 years is rich in description and analysis. Although the field of career counseling as a profession is relatively new, beginning around the turn of the 20th century, much progress had been made by the advent of the 21st century. Primarily through federal legislation and technological advances with the use of the Internet, career counseling has flourished and today is a profession with ethical standards, competencies, credentials, and professional organizations. Technology has had a major influence on service delivery, especially in the areas of career assessment and occupational information.

While much progress has been made in the use of technology in career counseling, potential problems exist and must be addressed for its effective use. In reviewing the literature, there was a distinct call for attention to be focused on the psychometric qualities of online assessments, confidentiality issues, and the need to monitor and update material available through the multitude of career-related Web sites. The benefits seemed to greatly outweigh the concerns and skepticism about the use of technology in career counseling and development activities, but the need for empirical studies on the effectiveness of career interventions, particularly via the Internet, was clear.

Although estimates of the number of college students undecided about college majors and careers varied, the incidence of undecidedness and the related undesirable effects were evident. Reports on the number of students undecided about college majors and on the average number of changes in college major indicated a relatively large range. A review of the literature suggested that there is much indecision with negative effects such as low self-esteem, high drop-out rates, and increased costs of a college education. The importance of effective career decision-making for students of all ages cannot be underestimated with its far-reaching benefits of building personal worth, values, and life-long skills.

The need for attention to career decision-making centered around the reality that the world of work demands that individuals are capable of making effective career decisions over the course of their lives. As Wood (1995) pointed out, careers are destined to change dramatically as a result of technology, and the literature reveals that her prediction has been valid. With levels of retention and academic success hinging on the state of decidedness about college majors and careers, career decision-making assistance has become critically important. In study after study, the importance of having a clear career focus was emphasized, although the importance of entering college with a declared major was debatable.

In reviewing the theoretical bases for career decision-making, theories included those which focused on developmental, life-span approaches, such as those of Super and Chickering, and emphasized the individual's self-concept and value systems. Other theories focused on the importance of congruence, or fit, of personal characteristics such as personality with the environment and particular clusters of

occupations. The father of vocational counseling, Frank Parsons, shared this theoretical approach along with other notable career theorists such as John Holland. References to and use of Holland's RIASEC typology abounded in the literature, and Holland's theory continues to be one of the most popular and most widely used career development theories.

Other theories well represented in the literature included Dorn's social influence theory which takes the approach that individuals have the ability to control their own circumstances and are capable of making good career decisions if they feel they are in control of them. Bandura's theory of self-efficacy was another of the widely circulated career development theories. Studies based on his theory suggested a strong relationship between confidence in making career decisions and the ability to make effective decisions.

The characteristics of undecided students garnered a significant amount of attention in the career development literature over the past several decades. While some of the characteristics were based on particular career development theories such as self-efficacy as a characteristic, other characteristics noted were based on similarities and the frequency of occurrence. Characteristics that appeared often in the literature were related to ability and personality as distinguishing factors between vocational decidedness and undecidedness. Part of the difficulty in classifying decided and undecided students stemmed from the differences in the reasons students are decided or undecided about career choices. Other characteristics of undecided students which appeared frequently in the literature included a lack of self concept

and self-efficacy, poor decision-making skills, and a lack of information about self, careers and major areas of study.

Much research related to career decision-making over the past several decades focused on the styles and types of career indecision as an approach to develop programs and services that will meet the needs of the various types. Although researchers varied on the reasons individuals differ in their career decision-making capacity, most did agree that there are several different types of undecided students. Many of the studies supported the relationship between systematic decision-making and career maturity and recognized the difference between career undecidedness and career indecisiveness. Probably one of the most significant results evident in this literature was the realization that as individuals differ in their styles and types of career indecision, various career interventions are more appropriate and effective for some rather than others, depending on their unique styles and types related to career decision-making.

Of all of the literature related to career decision-making, the most abundant area dealt with strategies and interventions. The strategies and interventions for career decision-making encompassed a huge arena of ways to assist individuals in the career decision-making process. The literature on career strategies and interventions was plentiful and varied, and numerous studies have been conducted in an attempt to document their effectiveness and feasibility for use with a multitude of individuals who represent different types, styles of career decision-making, ages, and backgrounds. Meta-analyses of studies on the effectiveness of career interventions

spanned several decades and indicated that career interventions are not a homogenous group of activities producing a homogenous effect.

Within the last decade, several significant studies related to the use of computer technology as a career intervention were conducted. The results of these studies were consistent in support of the need to investigate Web sites and computer assisted-programs for their effectiveness, including reliability and validity of online career assessments. As many of the researchers pointed out, technology has indeed unleashed an unprecedented number of potentially very useful career interventions, but caution is needed to ensure that they are of high quality and are used correctly to promote effective career decision-making.

CHAPTER 3

METHODOLOGY

The primary purpose of this study was to determine the influence of Career Discovery I, the first module in a computer-assisted program for career decision-making, on the stability of the choice of college majors over four semesters. This study sought to determine whether any differences existed in the stability of the choice of college major between students who entered a large Research-Extensive University with undeclared majors, used Career Discovery I, and declared a major by the end of fall 2000 and students who entered the same Research-Extensive University with declared majors and did not use Career Discovery I during the following semesters of investigation: fall 2000, spring 2001, fall 2001, and spring 2002. In addition, the study compared students who were undecided to those students with declared majors on selected personal and academic characteristics to determine if any of the characteristics had an impact on the stability of their college major/career choices. Finally, the study sought to determine if a model exists which explains a significant portion of the variance in the stability of choice of college major from selected demographic and academic factors.

The purpose of this chapter is to describe the research design, population, sample and sampling techniques, data collection and instrumentation procedures, and data analysis techniques.

Research Design

This study was designed as an exploratory correlational study with personal and academic variables as the predictors. The predictor variables were gender, age,

race, high school academic GPA, ACT composite score, on-campus housing, initial senior college entered, number of scholarships, and monetary value of scholarships. At the conclusion of the fourth semester, the cumulative college GPA and retention were included as variables. Stability of choice of college major was the criterion variable and was defined by whether or not there was a change in major after the initial declaration of college major and by the number of times students changed majors. The nature of the inferences involved the use of descriptive, comparative and correlational research methods.

Population and Sample

The target population for this study was all first semester freshmen enrolled in research-extensive universities in the southern portion of the United States. The accessible population was first semester freshmen in Center for Freshman Year at the Research-Extensive University at which the study was conducted. A sample of this accessible population was drawn using stratified random sampling procedures. A sample of 300 freshmen who entered the University in fall 2000 as undecided about a college major, used Career Discovery I, and declared a major by December 2000 and a sample of 300 freshmen who entered the University in fall 2000 with declared majors and did not use Career Discovery I were selected. Enrollment information on freshmen including college major from August 2000 and December 2000 was obtained from University Center for Freshman Year. Each subject remained anonymous through the assignment of a unique identification number; no names or identifying information were used.

Data Collection and Instrumentation Procedures

Data on the specific demographic and academic variables related to the objectives of this study were collected from the University's official records in the University's Measurement and Evaluation Center and the Office of Budget and Planning. From the Measurement and Evaluation Center, data maintained in the Student Information System (SIS) on the following variables were obtained: college, curriculum, gender, high school academic GPA, whether or not students used Career Discovery I, age, college GPA, retention, and ACT composite score. From the Office of Budget and Planning, data on the following variables was obtained from the Student Records and Registration database, the Student Financial Aid database, and the Student Housing database: race, on-campus housing, number of scholarships, monetary value of scholarships, whether or not an initial senior college was entered, initial senior college entered, last college as of May 2002, number of changes in college major, last term enrolled, and group (undecided or decided). Collection of data occurred at the beginning of the fall 2000 semester and at the end of the following semesters: fall 2000, spring 2001, fall 2001, and spring 2002.

The first sample included 32 students in the decided group who failed to meet a criterion required for inclusion in the study. Since at some point in the four semesters of investigation these students had used Career Discovery I, they were replaced with 32 students who had not used the program. Additionally, two students were found to be enrolled in the College of Agriculture and were replaced with two students in University Center for Freshman Year.

Data Analysis Techniques

Data collected in this study were analyzed using the following statistical procedures for each respective study objective.

Objectives 1, 2, 3, and 4

The first four objectives are descriptive in nature and were analyzed using descriptive statistics. The variables gender, race, on-campus housing, initial senior college entered, and whether or not subjects changed majors from their initial selection are nominal variables and were summarized using frequencies and percentages in categories. The variables age, academic high school GPA, ACT composite score, number of scholarships, monetary value of scholarships, and number of times subjects changed majors after their initial selection are interval variables and were summarized using means and standard deviations.

Objectives 5 and 6

Objectives 5 and 6 are comparative in nature and were analyzed at the conclusion of the fourth semester, spring 2002, by using comparative statistics. The nominal variables gender, race, initial college entered, and retention were analyzed using the Chi Square Test of Independence, and the interval variables age, high school academic GPA, college GPA, ACT composite score, number of scholarships, and the monetary value of scholarships were analyzed using the Independent t-test.

Objective 7

Objective 7 is correlational in nature and was analyzed by using discriminant analysis and multiple regression analysis to determine if a model exists which explains a significant portion of variance in the stability of choice of college major.

Discriminant analysis was used for the nominal variable, whether or not subjects changed majors, and multiple regression analysis was used for the interval variable, the number of times subjects changed majors. The nominal variables, whether or not subjects used Career Discovery I, gender, race, on-campus housing, whether or not students entered a senior college, initial senior college entered, retention, and the interval variables age, high school academic GPA, college GPA, number of scholarships, monetary value of scholarships, and the number of times subjects changed majors were used in the analyses. The variable college GPA was eliminated because students not retained through the fourth semester of investigation had no college GPAs for the purpose of this study. The variable race was dummy coded into whether or not students were White, ... Asian, ... Black, and ... Hispanic variables. The variable initial senior college entered was dummy coded into the following variables: whether or not students entered the College of Arts and Sciences, ... College of Art and Design, ... College of Agriculture, ... College of Business Administration, ... College of Basic Sciences, ... College of Education, ... College of Engineering, ... College of Mass Communication, and ... College of Music and Dramatic Arts.

Statistical analysis procedures were executed using the Statistical Package for Social Sciences (SPSS). The manner in which the variables were coded is included in the Appendix.

CHAPTER 4

FINDINGS

Objective One

Objective One was to describe students who entered a research-extensive university in the southern portion of the United States with undecided majors (subsequently referred to as undecided students) on the following selected demographic and academic measures: (1) Gender, (2) Age, (3), Race, (4) High school academic GPA, (5) ACT composite score, (6) On-campus housing, (7) Initial senior college entered, (8) Number of scholarships, and (9) Monetary value of scholarships.

Undecided Students

One group of study subjects was made up of a randomly drawn sample of 300 students who entered the research-extensive university in fall 2000 as undecided about college majors, used Career Discovery I, and declared a major by the end of the first semester of enrollment. Regarding the gender of this group of subjects, 188 were females (62.7%) and 112 were males (37.3%).

Age was defined as the student's age as of August 1, 2000 and was determined by computing the number of days between August 1, 2000 and the student's birthdate and converting this to an age in years. Regarding the age of the undecided students, the mean age was 18.33 ($SD = .65$, $n = 300$). Ages ranged from a low of 17.59 to a high of 26.60. In examining the age of students in categories, only 4 (1.3%) students were equal to or older than the age of 19.50 (see Table 1).

The age group with the largest number of students was 18.00 to 18.49 with 132 (44.0%) students.

Table 1

Age of Students Who Entered a Research-Extensive University with an Undecided Major

Age in years	<u>n</u>	%
< 17.50	0	0.0
17.50-17.99	73	24.3
18.00-18.49	132	44.0
18.50-18.99	85	28.4
19.00-19.49	6	2.0
≥19.50	4	1.3
Total	300	100.0

Note. Mean age was 18.33 (SD = .65). The youngest age was 17.59 and the oldest age was 26.60.

Another characteristic on which the students were described was race. Of the subjects for whom race data were available, the largest group of students in the undecided group were White (n = 271, 91.3%). Other reported races represented in the undecided group of students were Asian, Black, and Hispanic. There were 3 (1.0%) students who had no reported data for this demographic factor (see Table 2).

High school academic GPA is the grade point average computed by the admissions staff at the University for admissions decisions. It is based upon a 4.00

Table 2

Race of Students Who Entered a Research-Extensive University with an Undecided Major

Race	<u>n</u>	%
White	271	91.3
Asian	9	3.0
Hispanic	9	3.0
Black	8	2.7
Total	297	100.0

Note. 3 (1.0%) students did not report race.

scale and 17 ½ units in high school academic courses recommended by the University for admission. Regarding the high school academic grade point average of the undecided students, the mean was 3.25 (SD = .45, n = 299). GPAs ranged from a low of 2.32 to a high of 4.00. One (.3%) student had an incomplete high school record with no GPA (see Table 3). The GPA category which had the smallest number of students was 2.00 to 2.50 (n = 11, 3.8%). In addition, the remaining students were approximately evenly distributed in the highest three GPA categories.

Another characteristic on which the students were described was the composite score on the American College Test (ACT). Among this group of students, the mean composite ACT score was 24.1 (SD = 3.12, n = 296), and scores

Table 3

High School Academic GPA of Students Who Entered a Research-Extensive University with an Undecided Major

GPA	<u>n</u>	%
2.00-2.50	11	3.8
2.51-3.00	91	30.3
3.01-3.50	101	33.8
3.51-4.00	96	32.1
Total	<u>299</u>	<u>100.0</u>

Note. Mean GPA was 3.25 (SD = .45). One student (.3%) had an incomplete high school record. The lowest GPA was 2.32 and the highest GPA was 4.00.

ranged from 18 to 34. The largest number of students (n = 172, 58.2%) were in the 21 to 25 category of scores (see Table 4). Additionally, more than one-fourth (n = 80, 27.0%) of the students had ACT scores in the 26 to 30 category. ACT scores were not reported for 4 (1.3%) of the students.

The next characteristic on which the students were described was whether or not they lived on campus during their freshman year, fall 2000–spring 2001. Of this group, 152 (50.7%) lived in residential housing on campus and 148 (49.3%) lived off campus.

Students in the study sample were also described on the initial senior college they entered after leaving University Center for Freshman Year (UCFY). This description actually involved two measurements. The first of these measurements

Table 4**Composite Scores on the American College Test (ACT) for Students Who Entered a Research-Extensive University with an Undecided Major**

Score value range	<u>n</u>	%
0-10	0	0.0
11-15	0	0.0
16-20	33	11.1
21-25	172	58.2
26-30	80	27.0
31-36	11	3.7
-----	-----	-----
Total	296	100.0

Note. 4 (1.3%) students did not have ACT scores reported. Mean ACT score was 24.1 (SD = 3.12). Scores ranged from 18 to 34.

was whether or not the students had entered a senior college. Of the 300 students in the sample, 141 (47.0%) had entered a senior college by the end of their fourth semester of enrollment. The remaining 159 (53.0%) of the undecided students in the study had not entered a senior college. Of these 159 students, 113 (71.1%) were in University Center for Advising and Counseling (UCAC), but 46 (28.9%) were still classified as being in UCFY.

For the 141 students who had entered a senior college by the end of their fourth semester of enrollment, the two senior colleges with the largest enrollment

were the College of Arts and Sciences with 46 students (32.6%) and the College of Business Administration with 26 students (18.5%) (see Table 5).

Table 5

Initial Senior College Entered by Students Who Entered a Research-Extensive University with an Undecided Major

College	<u>n</u>	%
Arts and Sciences	46	32.6
Business Administration	26	18.5
Education	22	15.6
Art and Design	12	8.5
Agriculture	12	8.5
Basic Sciences	12	8.5
Engineering	7	5.0
Mass Communications	3	2.1
Music and Dramatic Arts	1	.7
Total	141	100.0

Note. 159 (53.0%) students did not enter a senior college. 113 (71.0%) of these students were in UCAC and 46 (28.9%) were in UCFY.

Another characteristic on which the students were described was the total number of academic scholarships received during the four semesters of investigation. This was measured as the total of the scholarships received each semester. For example, if students had a renewable scholarship (i.e., TOPS) that they received for

all four semesters of investigation, the total number of scholarships was computed as four scholarships. Only the number of academic scholarships was computed. Need-based and talent-based scholarships were excluded. The mean number of scholarships received was 3.4 ($SD = 1.91$, $n = 300$). The largest number of scholarships received by undecided students was 12 (see Table 6).

Table 6

Number of Scholarships Received by Students Who Entered a Research-Extensive University with an Undecided Major

Scholarships	n	%
0	28	9.3
1-3	66	22.0
4-6	193	64.3
7-9	6	2.0
10 or more	7	2.3
Total	300	99.9

Note. Mean number of scholarships received was 3.4 ($SD = 1.91$). The most frequently reported number of scholarships received was 4 ($n = 188$). The number of scholarships received ranged from 0 to 12.

There were 28 (9.3%) students who received no scholarships. The number of scholarships most frequently awarded was four which 188 (62.7%) students received over the four semesters of investigation. When the data regarding the number of scholarships received was examined in categories, the most frequently

reported category was the 4 to 6 scholarships category ($\underline{n} = 193, 64.3\%$). The category that included the fewest recipients was the 7 to 9 scholarships category ($\underline{n} = 6, 2.0\%$).

Closely related to the number of scholarships received by the undecided students was the total monetary value of the scholarships received. The 28 students who received no scholarships had the lowest monetary value of zero dollars, and the highest monetary value of scholarships received was \$10,156. The mean dollars of scholarship monies received by undecided students was \$5,038.05 ($\underline{SD} = 2395.31$). The number of students who received various levels of scholarship monetary value is presented in Table 7.

The largest group of students ($\underline{n} = 123, 41.0\%$) had scholarship values in the \$4,501 to \$6,000 category. The category of monetary value with the smallest number of students ($\underline{n} = 7, 2.3\%$) was the category of \$9,001 or more.

Table 7

Monetary Value of Scholarships Received by Students Who Entered a Research-Extensive University with an Undecided Major

Monetary Value (in dollars)	\underline{n}	%
0	28	9.3
001-1500	24	8.0
1501-3000	18	6.0

(table con't.)

3101-4500	23	7.7
4501-6000	123	41.0
6001-7500	52	17.3
7501-9000	25	8.3
9001 or more	7	2.3
Total	300	100.0

Note. Mean dollars of scholarship monies was \$5,038.05 ($SD = 2395.31$). The most frequent monetary value of scholarships received was \$5,916 ($n = 120, 40.0\%$). The lowest amount received was zero and the highest amount was \$10,156.

Objective Two

Objective Two was to describe students who entered a research-extensive university in the southern portion of the United States with declared majors (subsequently referred to as decided students) on the following selected demographic and academic measures: (1) Gender, (2) Age, (3) Race, (4) High school academic GPA, (5) ACT composite score, (6) On-campus housing, (7) Initial senior college entered, (8) Number of scholarships, and (9) Monetary value of scholarships.

Decided Students

The second group of study subjects was made up of a randomly drawn sample of 300 students who entered the research-extensive university in fall 2000 with declared majors and did not use Career Discovery I. Regarding the gender of this group of students, 150 were females (50.0%) and 150 were males (50.0%).

As for the undecided group, age was defined for this group as the student's age as of August 1, 2000 and was determined by computing the number of days between August 1, 2000 and the student's birthdate and converting this to an age in

years. Regarding the age of the decided students, the mean age was 18.34 ($SD = .58$, $n = 300$). Ages ranged from a low of 17.04 to a high of 24.82. In examining the age of students in categories, there were 5 (1.7%) students equal to or over the age of 19.50. The age range with the largest number of students was 18.00 to 18.49 with 123 (41.0%) students (see Table 8).

Table 8

Age of Students Who Entered a Research-Extensive University with a Declared Major

Age in years	n	%
>17.50	3	1.0
17.50-17.99	70	23.3
18.00-18.49	123	41.0
18.50-18.99	88	29.4
19.00-19.49	11	3.6
≥ 19.50	5	1.7
Total	300	100

Note. Mean age was 18.34 ($SD = .58$). The youngest age was 17.04 and the oldest age was 24.82.

Another characteristic on which the students were described was race. Of the subjects for whom race data were available, the largest number of students in the decided group were White ($n = 248$, 82.7%). Other races represented in the decided

group of students were Asian, Black, and Hispanic. There were 2 (.67%) students who had no reported data for this demographic factor (see Table 9).

Table 9

Race of Students Who Entered a Research-Extensive University with a Declared Major

Race	<u>n</u>	%
White	248	83.2
Black	32	10.8
Asian	14	4.7
Hispanic	4	1.3
Total	298	100.0

Note. 2 (.67%) students did not report race.

The high school academic GPA for this group of decided students was computed the same way as for undecided students. Regarding the high school academic GPA of students in the decided group, the mean was 3.28 (SD = .45, n = 293). GPAs ranged from a low of 2.06 to a high of 4.00 with 208 (71.0%) of the students in the highest two categories which ranged from 3.01 – 4.00. GPAs for six of the students were unavailable. In addition, one (.3%) student had an incomplete high school record with no GPA (see Table 10).

Another characteristic on which the decided students were described was the composite score on the American College Test (ACT). Among this group of

Table 10

High School Academic GPA of Students Who Entered a Research-Extensive University with a Declared Major

GPA	<u>n</u>	%
2.00-2.50	13	4.4
2.51-3.00	72	24.6
3.01-3.50	105	35.8
3.51-4.00	103	35.2
Total	293	100.0

Note. Mean GPA was 3.28 (SD = .45). One student (.3%) had an incomplete high school record and GPAs were missing for 6 (2.0%) of the students. The lowest GPA was 2.06 and the highest GPA was 4.00.

students, the mean composite ACT score was 24.5 (SD = 3.32, n = 286), and scores ranged from 18 to 33. The largest number of students (n = 142, 49.6%) were in the 21 to 25 range of scores (see Table 11). Additionally, 103 (36.1%) of the students had ACT scores in the 26 to 30 category. ACT scores were not reported for 14 of the students.

The next characteristic on which the students were described was whether or not they lived on campus during their freshman year, fall 2000-spring 2001. Of this group of decided students, 165 (55.0%) lived in residential housing on campus and 135 (45.0%) lived off campus.

Table 11**Composite Scores on the American College Test (ACT) for Students Who Entered a Research-Extensive University with a Declared Major**

Score value range	<u>n</u>	%
0-10	0	0.0
11-15	0	0.0
16-20	32	11.2
21-25	142	49.6
26-30	103	36.1
31-36	9	3.1
Total	286	100

Note. 14 (4.7%) students did not have ACT scores reported. Mean ACT score was 24.5 (SD = 3.32). Scores ranged from 18 to 33.

Students in the study sample were also described on the initial senior college they entered after leaving UCFY. As for the group of undecided students, this description involved two measurements. The first of these measurements was whether or not the students had entered a senior college. Of the 300 students in the sample, 144 (48.0%) had entered a senior college by the end of their fourth semester of enrollment. The remaining 156 (52.0%) of the decided students in the study had not entered a senior college. Of these 156 students, 84 (53.9%) were in UCAC, but 72 (46.2%) were still classified as being in UCFY (see Table 12).

Table 12

Initial Senior College Entered by Students Who Entered a Research-Extensive University with a Declared Major

College	<u>n</u>	%
Basic Sciences	33	22.9
Engineering	33	22.9
Arts and Sciences	22	15.3
Business Administration	14	9.7
Education	14	9.7
Art and Design	11	7.6
Music and Dramatic Arts	10	7.0
Mass Communications	4	2.8
Agriculture	3	2.1
Total	44	100.0

Note. 155 (52.0%) students did not enter a senior college. 84 (53.9%) of these students were in UCAC and 72 (46.2%) were in UCFY.

For the 144 students who had entered a senior college by the end of their fourth semester of enrollment, the two senior colleges with the largest enrollment were the College of Basic Sciences with 33 students (22.9%) and the College of Engineering with 33 students (22.9%).

Another characteristic on which the students were described was the total number of academic scholarships received during the four semesters of investigation. As with the group of undecided students, the total number of academic scholarships over four semesters was computed, and need-based and talent-based scholarships were excluded. The mean number of scholarships awarded was 3.0 ($SD = 2.01$, $n = 300$). The largest number of scholarships awarded to decided students was 10 (see Table 13).

Table 13

Number of Scholarships Received by Students Who Entered a Research-Extensive University with a Declared Major

Scholarships	n	%
0	41	13.7
1-3	90	30.0
4-6	155	51.6
7-9	9	3.0
10 or more	5	1.7
Total	300	100

Note. Mean number of scholarships received was 3.0 ($SD = 2.01$). The most frequently reported number of scholarships received was 4 ($n = 151$). The number of scholarships received ranged from 0 to 10.

There were 41 (13.7%) students who received no scholarships. The number of scholarships most frequently awarded was four which 151 (50.3%) students

received over the four semesters of investigation. When the data regarding the number of scholarships received was examined in categories, the most frequently reported category was the 4 to 6 scholarships category ($n = 155, 51.6\%$). The category that included the fewest recipients was the 10 or more scholarships category ($n = 5, 1.7\%$).

Closely related to the number of scholarships received by the decided students was the monetary value of the scholarships received. The 41 students who received no scholarships had the lowest monetary value of zero dollars, and the highest monetary value of scholarships received was \$10,556. The mean dollars of scholarship monies received by the decided students was \$4,490.18 ($SD = 2684.69$). The number of students who received various levels of scholarship monetary value is presented in Table 14.

Table 14

Monetary Value of Scholarships Received by Students Who Entered a Research-Extensive University with a Declared Major

Monetary value (in dollars)	n	%
0	41	13.7
001-1500	32	10.7
1501-3000	36	12.0
3101-4500	22	7.3
4501-6000	87	29.0

(table con't.)

6001-7500	40	13.3
7501-9000	36	12.0
9001 or more	6	2.0
	-----	-----
Total	300	100.0

Note. Mean dollars of scholarship monies was \$4,490.18 ($SD = 2684.69$). The most frequent monetary value of scholarships received was \$5,916 ($n = 82, 27.3\%$). The lowest amount received was zero and the highest amount received was \$10,556.

The largest group of students ($n = 87, 28.9\%$) had scholarship values in the \$4,501 to \$6,000 category. The category of monetary value with the smallest number of students ($n = 6, 2.0\%$) was the category of \$9001 or more.

Objective 3

Objective Three was to describe the stability of choice of college majors for students with undeclared majors who entered a research-extensive university in the southern portion of the United States, completed the Career Discovery I career decision-making program during fall 2000, the first semester of investigation, and declared a major by the end of the first semester of investigation. Stability for purposes of this objective is defined as: (1) Whether or not they changed majors after their initial selection, and (2) The number of times they changed majors. Of the undecided students, 161 (53.7%) did not change majors after their initial selection at the end of the fall 2000 semester, the first semester of investigation (see Table 15).

Among the undecided group of students, 139 (46.3%) did change majors after their initial selection of a college major at the end of the fall 2000 semester. Of the

Table 15

Number of Changes in Major After Initial Selection by Students Who Entered a Research-Extensive University with an Undecided Major

Number of changes	<u>n</u>	%
0	161	53.7
1	103	34.3
2	33	11.0
3	3	1.0
Total	300	100

Note. Mean number of changes in major was .59 (SD = .72).

students who changed majors after their initial selection, 103 (34.3%) students had one change in college major; 33 (11.0%) students had two changes in college major, and 3 (3.0%) students had three changes in college major. The mean number of changes in major was .59 (SD = .72)

Objective 4

Objective Four was to describe the stability of choice of college majors for students who entered a research-extensive university in the southern portion of the United States in fall 2000 with declared majors and did not use the Career Discovery career decision-making program during any of the four semesters of investigation. Stability for purposes of this objective is defined as: (1) Whether or not they changed

majors after their initial selection, and (2) The number of times they changed majors (see Table 16).

Table 16

Number of Changes in Major After Initial Selection by Students Who Entered a Research-Extensive University with a Declared Major

Number of changes	<u>n</u>	%
0	132	44.0
1	105	35.0
2	53	17.6
3	8	2.7
4	2	.7
Total	300	100.0

Note. Mean number of changes in major was .81 (SD = .87).

Of the decided students, 132 (44.0%) did not change majors after their initial selection of major on record as of August 2000. Among the decided group of students, 168 (56.1%) changed majors after their initial selection of a college major. Of the students who changed majors after their initial selection, 105 (35.0%) students had one change in college major; 53 (17.7%) students had two changes in college major; 8 (2.7%) students had three changes in college major; and 2 (.7) students had

four changes in college major. The mean number of changes in major was .81 (SD = .87).

Objective 5

Objective Five was to compare the students who entered a research-extensive university in the southern portion of the United States, completed the Career Discovery I career decision-making program during fall 2000, the first semester of investigation, and declared a major by the end of the first semester of investigation with students who entered the same university in fall 2000 with declared majors and did not use the Career Discovery I career decision-making program during any of the four semesters of investigation. Students were compared on each of the following variables: (1) Gender, (2) Age, (3) Race, (4) High school academic GPA, (5) College GPA, (6) On-campus housing, (7) ACT composite score, (8) Initial senior college entered, (9) Retention, (10) Number of scholarships, and (11) Monetary value of scholarships. The comparison was made at the conclusion of the fourth semester of enrollment to determine if differences existed in the two groups when compared on the 11 variables.

Students were compared on variables that were measured on a categorical (nominal or ordinal) scale of measurement using the Chi-square Test of Independence to determine if each variable was independent of the variable, group (undecided or decided). The cross classification by gender is presented in Table 17.

The nature of the association between the variables was such that the majority (62.7%) of the undecided group was female while the decided group had equal numbers of males and females (50.0% each).

Table 17

Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Gender

Gender	Undecided group	Decided group	Total
	<u>n</u> %	<u>n</u> %	<u>n</u> %
Female	<u>188</u> 62.7	<u>150</u> 50.0	<u>338</u> 56.3
Male	<u>112</u> 37.3	<u>150</u> 50.0	<u>262</u> 43.7
Total	<u>300</u> 100.0	<u>300</u> 100.0	<u>600</u> 100.0

Note. Chi-square value = 9.784, $p = .002$.

The undecided and decided groups of students were also compared on variable race. The cross-classification of the variables race and group (specified as undecided or decided regarding major upon entry into the University) is presented in Table 18. Students for whom data on the variable race was unknown were eliminated from this analysis which reduced the total number of study subjects from 600 to 595. The calculated Chi-square was significant ($X^2_{(3)} = 18.428$, $p < .001$) indicating that the variables race and group (undecided and decided) were not independent. The nature of the association between the variables was such that the undecided group had a higher percentage of “White” students (91.2% compared to 83.2% of the

decided group) whereas the decided group consisted of a higher percentage of “Black” students (10.7% compared to 2.7% in the undecided group).

Table 18

Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Race

Race	Undecided group	Decided group	Total
	$\frac{n}{\%}$	$\frac{n}{\%}$	$\frac{n}{\%}$
White	$\frac{271}{91.2}$	$\frac{248}{83.2}$	$\frac{519}{87.2}$
Asian	$\frac{9}{3.0}$	$\frac{14}{4.7}$	$\frac{23}{3.9}$
Black	$\frac{8}{2.7}$	$\frac{32}{10.7}$	$\frac{40}{6.7}$
Hispanic	$\frac{9}{3.0}$	$\frac{4}{1.3}$	$\frac{13}{2.2}$
Total	$\frac{297}{100.0}$	$\frac{298}{100.0}$	$\frac{595}{100.0}$

Note. Chi-square value = 18.428, $p < .001$.

Students in the two groups (undecided and decided) were also compared on the variable on-campus housing. The calculated Chi-square value ($X^2_{(1)} = 1.130$, $p = .288$) was not significant indicating that the variables on-campus housing (defined as whether or not the students lived in campus housing during their freshman year in college) and group were independent (see Table 19).

Table 19

Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Whether or Not They Lived in On-Campus Housing

On-campus housing	Undecided group	Decided group	Total
	<u>n</u> %	<u>n</u> %	<u>n</u> %
No	<u>148</u> 49.3	<u>135</u> 45.0	<u>283</u> 47.2
Yes	<u>152</u> 50.7	<u>165</u> 55.0	<u>317</u> 52.8
Total	<u>300</u> 100.0	<u>300</u> 100.0	<u>600</u> 100.0

Note. Chi-square value = 1.130, $p = .288$.

Regarding whether or not students had entered a senior college by the end of the fourth semester of investigation, 141 (47.0%) of the undecided group had entered a senior college and 144 (48.0%) of the decided group had entered a senior college. The cross classification of these variables is presented in Table 20.

The Chi-square Test of Independence was used to determine if this variable was independent of the variable group (defined as undecided or decided regarding major selection at the time of college entry). The calculated Chi-square value ($X^2_{(1)} = .060$, $p = .81$) was not significant indicating that the variables whether or not the student had entered a senior college by the end of the fourth semester of investigation and group were independent.

Table 20

Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Whether or Not They Had Entered A Senior College

Entered senior college	Undecided group	Decided group	Total
	<u>n</u> %	<u>n</u> %	<u>n</u> %
No	<u>159</u> ^a 53.0	<u>156</u> ^b 52.0	<u>315</u> 52.5
Yes	<u>141</u> 47.0	<u>144</u> 48.0	<u>285</u> 47.5
Total	<u>300</u> 100.0	<u>300</u> 100.0	<u>600</u> 100.0

Note. Chi-square value = .060, $p = .806$.

^a113 (71.1%) undecided students entered UCAC and 46 (53.9%) remained in UCFY.

^b84 (53.9%) decided students entered UCAC and 72 (46.2%) remained in UCFY.

The Chi-square Test of Independence was also used to determine if the variables group (undecided or decided) and initial senior college entered were independent. The calculated Chi-square value ($X^2_{(8)} = 53.473$, $p < .001$) was significant indicating that the variables were not independent. The nature of the association between the variables was such that a higher proportion of the undecided group entered the following colleges: Arts and Sciences (32.6% compared to 15.3% of the decided group); Agriculture (8.5% compared to 2.1% of the decided group); Business Administration (18.4% compared to 9.7% of the decided group); and Education (15.6% compared to 9.7% of the decided group). The cross classification decided group entered the following colleges: Basic Sciences (22.9% compared to

Table 21**Cross Classification of Students Who Entered a Research-Extensive University as Undecided and Decided and Initial Senior College Entered**

Initial senior college	Undecided group	Decided group	Total
	<u>n</u> %	<u>n</u> %	<u>n</u> %
Arts & Sciences	<u>46</u> 32.6	<u>22</u> 15.3	<u>68</u> 23.9
Business Administration	<u>26</u> 18.4	<u>14</u> 9.7	<u>40</u> 14.0
Education	<u>22</u> 15.6	<u>14</u> 9.7	<u>36</u> 12.6
Art & Design	<u>12</u> 8.5	<u>11</u> 7.6	<u>23</u> 8.1
Agriculture	<u>12</u> 8.5	<u>3</u> 2.1	<u>15</u> 5.3
Basic Sciences	<u>12</u> 8.5	<u>33</u> 22.9	<u>45</u> 15.8
Engineering	<u>7</u> 5.0	<u>33</u> 22.9	<u>40</u> 14.0
Mass Communications	<u>3</u> 2.1	<u>4</u> 2.8	<u>7</u> 2.5
Music & Dramatic Arts	<u>1</u> .7	<u>10</u> 6.9	<u>11</u> 3.9
Total	<u>141</u> 100.0	<u>144</u> 100.0	<u>285</u> 100.0

Note. Chi-square value = 53.473, $p < .001$.

8.5 of the undecided group); Engineering (22.9% compared to 5.0% of the undecided group); and Music and Dramatic Arts (6.9% compared to 0.7% of the undecided group).

The undecided and decided students were also compared on the variable retention (defined as still enrolled at the conclusion of the fourth semester of investigation). The calculated Chi-square was not significant ($X^2_{(1)} = 3.072$, $p = .080$) indicating that the variables retention and group (undecided or decided) were independent (see Table 22).

Table 22

Cross Classification of Students Who Entered a Research-Extensive University as Undecided and Decided Students and Retention

Retention	Undecided group	Decided group	Total
	<u>n</u> %	<u>n</u> %	<u>n</u> %
No	<u>42</u> 14.0	<u>58</u> 19.3	<u>100</u> 16.7
Yes	<u>258</u> 86.0	<u>242</u> 80.7	<u>500</u> 83.3
Total	<u>300</u> 100.0	<u>300</u> 100.0	<u>600</u> 100.0

Note. Chi-square value = 3.072, $p = .080$.

Students who entered the university classified as undecided were compared with those who entered as decided (with selected majors) on the variables which were measured on an interval scale using the Independent t-test. These comparisons included the variables age, high school academic GPA, college GPA, ACT

composite score, number of scholarships received, and monetary value of scholarships received. Students in the groups were found to be significantly different on two of the six measurements (see Table 23). Students in the undecided group

Table 23

Comparison of Selected Demographic and Academic Measures by Whether or Not Students Entered a Research-Extensive University with Selected Majors

Variable	Undecided	Decided	t	df	p
	<u>X</u> <u>SD</u>	<u>X</u> <u>SD</u>			
Value of Scholarships	<u>5038.1</u> 2395.31	<u>4490.2</u> 2684.69	2.637	598	.009
Scholarships	<u>3.4</u> 1.91	<u>3.0</u> 2.00	2.531	598	.012
College	<u>3.1</u> .55	<u>3.0</u> .63	1.478	498	.140
Age	<u>18.3</u> .65	<u>18.3</u> .58	-.145	598	.884
HSAGPA ^a	<u>3.3</u> .45	<u>3.3</u> .45	-.876	590	.381
ACT	<u>24.1</u> 3.12	<u>24.5</u> 3.32	-1.488	580	.138

^a High school academic grade point average

received a mean number of scholarships of 3.4 (SD = 1.91), and the decided group received a mean of 3.0 (SD = 2.00) scholarships ($t_{(598)} = 2.531, p = .012$).

Relatedly, the undecided group was also found to have received a significantly higher monetary value in scholarships. The undecided group had received a mean value of \$5,038.05 ($\underline{SD} = 2395.31$) in scholarship monies while the decided group had received an average value of \$4,490.18 ($\underline{SD} = 2684.69$) in scholarship funds ($t_{(598)} = 2.637, p = .009$). No differences were found in age or the three academic measurements on which the undecided and decided groups were compared.

Objective 6

Objective 6 was to compare the stability of choice of college major of a group of students who entered a research-extensive university in the southern portion of the United States with undeclared majors, completed the Career Discovery I career decision-making program during fall 2000 and declared a major by December 2000 with a group of students who entered the same university with declared majors and did not complete the Career Discovery I career decision-making program. The comparison was made at the conclusion of the fourth semester (spring 2002). Stability for the purposes of this objective is defined as (1) Whether or not they changed majors after their initial selection, and (2) The number of times they changed majors.

The groups were first compared on whether they had changed majors between the start of the first semester of investigation, fall 2000, and the conclusion of the fourth semester of investigation, spring 2002. Following this analysis, the groups were compared on the number of changes in college major after the initial selection.

The Chi-square Test of Independence was used to compare undecided and decided students on the categorical variable whether or not students changed majors after their initial selection. The calculated Chi-square was significant ($X^2_{(1)} = 5.610$, $p = .018$) indicating that the variables whether or not students changed majors after their initial selection and group (undecided and decided) were not independent. The cross-classification of the variables is presented in Table 24.

Table 24

Cross Classification of Students Who Entered a Research-Extensive University by Whether They Enrolled as Undecided or Decided and Whether or Not They Changed Majors After the Initial Selection

Change in major	Undecided group	Decided group	Total
	<u>n</u> %	<u>n</u> %	<u>n</u> %
No	<u>161</u> 53.7	<u>132</u> 44.0	<u>293</u> 48.8
Yes	<u>139</u> 46.3	<u>168</u> 56.0	<u>307</u> 51.2
Total	<u>300</u> 100.0	<u>300</u> 100.0	<u>600</u> 100.0

Note. Chi-square value 5.610, $p = .018$.

The majority of students in the undecided group who had used Career Discovery I had not changed majors while the majority of students who entered the University with a declared major and did not use Career Discovery I had changed majors. Of the undecided students, 161 (53.7%) had not changed majors after the initial selection of a major while 139 (46.3%) had one or more changes in major after

the initial selection. Of the decided students, 132 (44.0%) had no changes in major after the initial selection while 168 (56.0%) had one or more changes in major after the initial selection.

The Independent t-test was used to compare undecided and decided students on the variable the number of times students changed major (see Table 25). The number of changes in major is defined as the number of times major was changed after a major was declared. Students in the groups were found to be significantly different on this measurement. Students who entered the university as undecided about a college major had a mean number of changes in college major of .59 ($SD = .72$), while students who entered the university with declared majors (decided students) had a mean of .81 ($SD = .87$) changes in college major ($t_{(598)} = 3.326$, $p = .001$).

Objective 7

Objective 7 was to determine if a model exists which explains a significant portion of variance in the stability of choice of college major as measured by whether or not students changed majors and the number of times they changed majors from the following variables: (1) Gender, (2) Age, (3) Race, (4) High school academic GPA, (5) College GPA, (6) ACT composite score, (7) On-campus housing, (8) Whether or not a senior college was entered, (9) Initial senior college entered, (10) Retention, (11) Number of scholarships, (12) Monetary value of scholarships, and (13) Whether or not they used Career Discovery I. Stability of choice of college major was defined as (1) Whether or not students changed majors after their initial selection, and (2) The number of times they changed majors. To accomplish this

objective, the data was examined by using an exploratory discriminant analysis for the dependent variable whether or not students changed majors after their initial selection. A multiple regression analysis was conducted for the dependent variable the number of times they changed majors.

The first step in developing the discriminant model was to dummy code two of the variables. The variables race and initial senior college entered were dummy coded to be properly reflected in the model. For the variable race, four “yes or no” variables were created to reflect White, Asian, Black, and Hispanic ethnic background of the students. For the variable initial senior college entered, nine “yes or no” variables were created to reflect the following colleges: Arts and Sciences, Art and Design, Agriculture, Business Administration, Basic Sciences, Education, Engineering, Mass Communication, and Music and Dramatic Arts. College GPA was not included because it was reported for only the fourth semester of enrollment and was, therefore, available only for those students who had completed all four semesters of work.

The next step in developing the discriminant model was to compare the groups (those who had changed majors and those who had not changed majors) on each of the independent variables (see Table 25). Of the 21 factors on which the comparisons were made, the groups were found to be significantly different on five variables. The variables on which the groups were found to be significantly different were retention, whether or not students entered the College of Engineering, whether or not students used Career Discovery I, whether or not students entered the College

of Agriculture, and whether or not students entered the College of Mass
Communication.

Table 25

**Comparison of Discriminating Variable Means in the Discriminant Model by
Whether or Not Students Changed Majors**

Discriminating variable	Changed major		F ratio	p
	<u>No</u>	<u>Yes</u>		
	<u>X</u> <u>SD</u>	<u>X</u> <u>SD</u>		
Retention	<u>.8</u> <u>.42</u>	<u>.9</u> <u>.30</u>	18.13	<.01
Engineering	<u>.1</u> <u>.29</u>	<u>.0</u> <u>.20</u>	6.98	.01
Used CDI ^a	<u>1.4</u> <u>.50</u>	<u>1.5</u> <u>.50</u>	4.99	.03
Agriculture	<u>.0</u> <u>.10</u>	<u>.0</u> <u>.20</u>	4.80	.03
Mass Communication	<u>.0</u> <u>.15</u>	<u>.0</u> <u>.06</u>	4.10	.04
Business Administration	<u>.1</u> <u>.21</u>	<u>.1</u> <u>.28</u>	3.53	.06
Value ^b	<u>4698.96</u> <u>2558.49</u>	<u>5081.60</u> <u>2370.98</u>	3.47	.06
If senior college ^c	<u>.4</u> <u>.50</u>	<u>.5</u> <u>.50</u>	3.42	.07
Arts and Sciences	<u>.1</u> <u>.29</u>	<u>.1</u> <u>.35</u>	3.37	.07

(table con't.)

White	$\frac{.9}{.36}$	$\frac{.9}{.31}$	3.12	.08
Art and Design	$\frac{.0}{.16}$	$\frac{.1}{.23}$	2.91	.09
Scholarships	$\frac{3.2}{2.01}$	$\frac{3.4}{1.82}$	2.21	.14
Asian	$\frac{.1}{.21}$	$\frac{.0}{.16}$	1.73	.19
HSAGPA ^d	$\frac{3.3}{.45}$	$\frac{3.3}{.45}$	1.44	.23
Age	$\frac{18.3}{.46}$	$\frac{18.3}{.40}$	1.10	.30
Hispanic	$\frac{.0}{.17}$	$\frac{.0}{.13}$	1.00	.32
Gender	$\frac{.4}{.49}$	$\frac{.5}{.50}$	.91	.34
ACT	$\frac{24.4}{3.22}$	$\frac{24.2}{3.25}$	.79	.38
Housing ^e	$\frac{.5}{.50}$	$\frac{.5}{.50}$	.43	.51
Education	$\frac{.1}{.25}$	$\frac{.1}{.23}$	.38	.54
Music and Dramatic Arts	$\frac{.0}{.10}$	$\frac{.0}{.13}$	.35	.56

^aWhether or not students used Career Discovery I

^bMonetary value of scholarships

^cWhether or not a senior college was entered

^dHigh school academic GPA

^eWhether or not students lived in on-campus housing during their first year

After comparing the discriminating variable means, the next step in conducting the discriminant analysis was to examine the independent variables included in the analysis for the presence of multicollinearity. The preferred method of assessing multicollinearity according to Lewis-Beck (1980) is to regress each independent variable on all the other independent variables so that the relationship of each of the independent variables with all of the other independent variables is considered. He explained that when any of the R^2 's from equations which result from this procedure is near 1.0, there is high multicollinearity.

When the cumulative R was checked to determine whether or not it approached 1.0, the following variables were found to have perfect collinearity: White, Black, Asian, and Hispanic. Each of these four dichotomous variables created from the variable race was found to be perfectly collinear with the combination of the other three variables. For example, the variable whether or not students were Black was perfectly collinear with the combination of the variables whether or not students were White, whether or not students were Asian, and whether or not students were Hispanic. Therefore, one of the four dummy coded variables had to be eliminated from the analysis. The variable that was found to have the lowest relationship with the dependent variable (whether or not students changed majors) was selected for elimination from the analysis. This variable was whether or not students were Black. Therefore, this variable was eliminated from the analysis, and the multicollinearity check was re-done to verify that this procedure eliminated the collinearity problem in the data.

The second variable that was found to have multicollinearity problems involved the nine dummy coded variables representing whether or not students entered each of the academic colleges. The variable whether or not students entered the College of Basic Sciences was found to have high multicollinearity with the other eight variables (whether or not students entered each of the other eight senior colleges). For example, the variable whether or not students entered the College of Basic Sciences was collinear with the combination of variables whether or not students entered the College of Arts and Sciences, ... the College of Art and Design, ... the College of Agriculture, ... the College of Business Administration, ... the College of Basic Sciences, ... the College of Education, ... the College of Engineering, ... the College of Mass Communication, and ... the College of Music and Dramatic Arts. Therefore, one of the nine dummy coded variables had to be eliminated from the analysis. The variable that was found to have the lowest relationship with the dependent variable (whether or not students changed majors) was selected for elimination from the analysis. This variable was whether or not students entered the College of Basic Sciences. Therefore, this variable was eliminated from the analysis, and the multicollinearity check was re-done to verify that this procedure eliminated the collinearity problem in the data.

In the third step, the computed standardized canonical discriminant function coefficients were examined. The centroids for the groups were determined to be -.369 for those who did not change majors and .339 for those who did change majors. A total of 12 variables entered the discriminant model and produced an overall canonical correlation of $\underline{R} = .334$ ($\underline{p} < .001$). This indicates that the

combination of the 12 variables in the model explained a total of 11.2% of the variability in whether or not students changed majors after the initial selection. These 12 variables were retention, whether or not students used Career Discovery I, whether or not students entered the College of Engineering, ACT composite score, whether or not students entered the College of Agriculture, whether or not students entered the College of Mass Communication, high school academic GPA, whether or not students were White, whether or not students entered the College of Arts and Sciences, gender, whether or not students entered the College of Business Administration, and whether or not students entered the College of Art and Design. Regarding the dependent variable whether or not students changed majors, the variable retention had an impact such that the students who were not enrolled through the fourth semester of investigation (not retained) tended to be less likely to have changed majors. The variable whether or not students used Career Discovery I had an impact on the dependent variable such that students who used Career Discovery I tended to be less likely to have changed majors. The variable whether or not students entered the College of Engineering had an impact on the dependent variable such that students who entered the College of Engineering tended to be less likely to have changed majors than students who did not enter the College of Engineering.

Of the remaining variables that entered the discriminant model, the following characteristics tended to be associated with a decrease in the likelihood that students had changed majors after their initial selection: (a) attainment of higher scores on the ACT composite measure, (b) the initial senior college entered as one other than

Agriculture, (c) the initial senior college entered as Mass Communication, (d) lower measurements on the high school academic GPA, (e) the race of the student as White (versus non-White), (f) the initial senior college entered as one other than Arts and Sciences, (g) the gender of students as female, (h) the initial senior college entered as one other than Business Administration, and (i) the initial senior college entered as one other than Art and Design (see Table 26).

Table 26

Summary Data for the Stepwise Analysis of the Discriminant Model for Whether or Not Students Changed Majors

Variables	b	s	<u>Discriminant functions</u> Group centroids
Retention	.55	.50	No Change in Major -.369
Used CDI ^a	-.54	.26	Changed Majors .339
Engineering	-.48	-.31	
ACT	-.36	-.10	
Agriculture	.29	.26	
Mass Communication	-.28	-.24	
HSAGPA ^b	.27	.14	
White	.27	.21	
Arts and Sciences	.26	.22	
Gender	.21	.11	
Business Administration	.20	.22	
Art and Design	.19	.20	

^aWhether or not students used Career Discovery I

^bHigh school academic GPA

<u>Eigen Value</u>	<u>Rc</u>	<u>Wilks' Lambda</u>	<u>p</u>
.125	.334	.889	< .001

b = standardized discriminant function coefficient

s = within group structure coefficient

Rc = canonical correlation coefficient

The structure coefficients ordered by size of correlation within discriminant function are presented in Table 27. The rule of thumb for interpreting structure coefficients is to examine all of those which are 1/2 or higher of the highest structure coefficient in value. Variables which met this criterion were retention, whether or not students entered the College of Engineering, whether or not a senior college was entered, whether or not students used Career Discovery I, and whether or not students entered the College of Agriculture.

Table 27

Structure Coefficients of Discriminating Variables with Discriminant Function Scores

Variables	Coefficients
Retention	.502
Engineering	-.312
If senior college ^a	.283
Used CDI ^b	.264
Agriculture	.258
Mass Communication	-.239
Business Administration	.222
Arts and Sciences	.216
Value ^c	.21

(table con't.)

White	.210
Art and Design	.201
Scholarships	.177
HSAGPA ^d	.142
Asian	-.128
Gender	.112
ACT	-.104
Music and Dramatic Arts	.095
Hispanic	-.085
Age	.064
Housing ^e	-.027
Education	.008

^aWhether or not a senior college was entered

^bWhether or not students used Career Discovery I

^cMonetary value of scholarships

^dHigh school academic GPA

^eWhether or not students lived in on-campus housing during their first year

Finally, the correctly classified cases were examined. Since only 4.2% of the students were eliminated due to missing values, the mean substitution function was not utilized. The substantive significance of percentage of cases correctly classified was assessed using the Tau statistic. The discriminant model correctly classified 64.2% of the cases analyzed (see Table 28).

The equation used for the Tau statistic as presented by Barrick and Warmbrod (1988) is given in Equation 1. This procedure determines the proportion of cases correctly classified more than would have been expected by chance. The findings were a 28.4% improvement over chance or randomness that could be obtained on these students using the predictive formula.

Equation 1

$$\tau = \frac{n_c - \sum p_i n_i}{N - \sum p_i n_i}$$

n_c = number correctly classified

p_i = probability of being classified into a group by chance

n_i = number in a group

N = total number of cases (Barrick and Warmbrod, 1988)

$$\tau \text{ for all variables} = \frac{369.2 - (.5)(247) + (.5)(328)}{575 - (.5)(247) + (.5)(328)} = 28.4\%$$

Table 28

Classification of Cases by the Regression Model for Whether or Not Students Changed Majors

Actual group	No. of cases	Predicted group	
		No change	Changed
No change in major	275	158 57.5%	117 42.5%
Changed majors	300	89 29.7%	211 70.3%

Note. Percent of cases correctly classified: 64.2%

To determine if a model existed which explained a significant portion of the variance in the stability of college major choice based on the number of times students changed majors for the undecided and decided students, a multiple

regression analysis was performed. The variables race and initial senior college entered were dummy coded to be properly reflected in the model in the same manner as for the discriminant model. For the variable race, four “yes or no” variables were created to reflect White, Asian, Black, and Hispanic ethnic background of the students. For the variable initial senior college entered, nine “yes or no” variables were created to reflect the following colleges: Arts and Sciences, Art and Design, Agriculture, Business Administration, Basic Sciences, Education, Engineering, Mass Communication, and Music and Dramatic Arts. College GPA was not included because it was reported for only the fourth semester of enrollment and, therefore, was available only for those students who had completed all four semesters of work.

The other variables were treated as independent variables, and stepwise entry of the variables was used because of the exploratory nature of this part of the study. In this regression equation variables were added that increased the explained variance by one percent or more as long as the overall regression equation remained significant. For descriptive purposes, the two-way correlations between factors used as independent variables in the regression and number of college major changes are presented in Table 29. At least four of these variables were found to have significant bivariate correlations with the number of times students changed major.

The independent variables included in the analysis were examined for the presence of multicollinearity. The preferred method of assessing multicollinearity according to Lewis-Beck (1980) is to regress each independent variable on all the other independent variables so that the relationship of each of the independent variables with all of the other independent variables is considered. He explained

Table 29**Relationship Between Selected Characteristics and the Number of Times Undecided and Decided Students Changed Majors**

Characteristics	<u>r</u>	<u>p</u>
Retention	.20	<.01
Art and Design	.16	<.01
Used CDI ^a	- .14	<.01
Engineering	-.09	.01
Housing ^b	.07	.06
ACT	-.06	.06
Agriculture	.06	.07
Arts and Sciences	.06	.07
Value ^c	.06	.09
Asian	-.05	.13
Hispanic	-.05	.14
If senior college ^d	.05	.11
Scholarships	-.05	.13
Mass Communication	-.04	.18
White	.04	.16
Age	-.03	.20
Business Administration	.03	.21

(table con't.)

Music and Dramatic Arts	-.03	.26
Gender	.02	.34
HSAGPA ^e	.02	.35
Education	.01	.44

^a Whether or not students used Career Discovery I

^b Whether or not students lived in on-campus housing during the first year

^c Monetary value of scholarships

^d Whether or not a senior college was entered

^e High school academic GPA

that when any of the R^2 's from equations which result from this procedure is near 1.0, there is high multicollinearity. When the cumulative R was checked to determine whether or not it approached 1.0, the following variables were found to have perfect collinearity: White, Black, Asian, and Hispanic. Each of these four dichotomous variables created from the variable race was found to be perfectly collinear with the combination of the other three variables. For example, the variable whether or not the student was Black was perfectly collinear with the combination of the variables whether or not the students were White, whether or not the students were Asian, and whether or not the students were Hispanic. Therefore, one of the four dummy coded variables had to be eliminated from the analysis. The variable that was found to have the lowest relationship with the dependent variable (the number of college major changes) was selected for elimination from the analysis. This variable was the variable whether or not the student was Black. Therefore, this variable was eliminated from the analysis, and the multicollinearity check was re-done to verify that this procedure eliminated the collinearity problem in the data.

The second variable that was found to have multicollinearity problems involved the nine dummy coded variables representing whether or not students entered each of the academic colleges. The variable whether or not students entered the College of Basic Sciences was found to have high multicollinearity with the other eight variables (whether or not students entered each of the other eight senior colleges). For example, the variable whether or not students entered the College of Basic Sciences was collinear with the combination of variables whether or not students entered the College of Arts and Sciences, ... the College of Art and Design, ... the College of Agriculture, ... the College of Business Administration, ... the College of Basic Sciences, ... the College of Education, ... the College of Engineering, ... the College of Mass Communication, and ... the College of Music and Dramatic Arts. Therefore, one of the nine dummy coded variables had to be eliminated from the analysis. The variable that was found to have the lowest relationship with the dependent variable (whether or not students changed majors) was selected for elimination from the analysis. This variable was whether or not students entered the College of Basic Sciences. Therefore, this variable was eliminated from the analysis, and the multicollinearity check was re-done to verify that this procedure eliminated the collinearity problem in the data.

The results of the multiple regression analysis indicated that five of the 21 variables entered the regression model. They were: Retention, whether or not students used Career Discovery I, whether or not students entered the College of Engineering, whether or not students entered the College of Art and Design, and ACT composite score. These five variables explained 11.2% of the variance in the

dependent variable. All of the remaining 16 independent variables were excluded from the model (see Table 30).

Table 30

Multiple Regression Analysis of the Number of Times Undecided and Decided Students Changed Majors on Selected Characteristics

Source of Variation	df	Ms	F-ratio	p
Regression	5	8.51	14.65	<.001
Residual	594	.58		

Total	599			
-------	-----	--	--	--

Variables in the Equation

Variables	R ² Cumulative	R ² Change	F Change	p Change	Beta
Retention	.04	.04	25.24	<.001	.23
Used CDI ^a	.06	.02	14.21	<.001	-.18
Engineering	.08	.02	14.05	<.001	-.139
Art and Design	.10	.02	11.9	.001	.13
ACT	.11	.01	4.88	.028	-.09

^aWhether or not students used Career Discovery I

Variables Not in the Equation

Variables	t	Sign t
HSAGPA ^a	1.12	.26
Age	-.78	.43
Asian	-1.06	.29

(table con't.)

White	1.25	.21
Hispanic	-.82	.41
Scholarships	.17	.87
Value ^b	.21	.84
Gender	.47	.64
Housing ^c	1.52	.13
Arts and Sciences	1.46	.15
Agriculture	1.32	.19
Business Administration	.66	.51
Education	-.23	.82
Mass Communication	-1.20	.23
Music and Dramatic Arts	-1.58	.11
If Senior College ^d	-.51	.61

^a High school academic GPA

^b Monetary value of scholarships

^c Whether or not students lived in on-campus housing during their first year

^d Whether or not a senior college was entered

Of the variables that entered the regression model, the following characteristics tended to be associated with a decrease in the number of times students had changed majors after their initial selection: (a) students' completion of Career Discovery I, (b) the initial senior college entered as the College of Engineering, and (c) attainment of higher scores on the ACT composite measure. Of the remaining two variables that entered the regression model, the following characteristics tended to be associated with an increase in the number of times students had changed majors after their initial selection: (a) retention of students, and (b) the initial senior college entered as the College of Art and Design.

CHAPTER 5

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary

The primary purpose of this study was to determine the influence of Career Discovery I, the first module in a computer-assisted program for career decision-making, on the stability of the choice of college majors over four semesters. This study sought to determine whether any differences existed in the stability of the choice of college major between students who entered a large Research-Extensive University with undeclared majors, used Career Discovery I, and declared a major by the end of fall 2000 and students who entered the same Research-Extensive University with declared majors and did not use Career Discovery I during the semesters of investigation. In addition, the study compared students who were undecided to those students with declared majors on selected personal and academic characteristics to determine if any of the characteristics had an impact on the stability of their college major/career choices. Finally, the study sought to determine if a model exists which explains a significant portion of the variance in the stability of choice of college major from selected demographic and academic factors.

The following objectives were developed to guide the research:

1. Describe students who entered a research-extensive university in the southern portion of the United States with undeclared majors on the following selected demographic and academic measures:
 - (a) Gender

- (b) Age
 - (c) Race
 - (d) High school academic GPA
 - (e) ACT composite score
 - (f) On-campus housing
 - (g) Initial senior college entered
 - (h) Number of scholarships
 - (i) Monetary value of scholarships
2. Describe students who entered a research-extensive university in the southern portion of the United States with declared majors on the following selected demographic and academic measures:
- (a) Gender
 - (b) Age
 - (c) Race
 - (d) High school academic GPA
 - (e) ACT composite score
 - (f) On-campus housing
 - (g) Initial senior college entered
 - (h) Number of scholarships
 - (i) Monetary value of scholarships
3. Describe the stability of choice of college majors for students with undeclared majors who entered a research-extensive university in the southern portion of the United States, completed the Career Discovery I

career decision-making program during fall 2000, and declared a major by December 2000. Stability for purposes of this objective is defined as:

- (a) Whether or not they changed majors from their initial selection
- (b) The number of times they changed majors

4. Describe the stability of choice of college majors for students who entered a research-extensive university in the southern portion of the United States with declared majors and did not complete the Career Discovery I career decision-making program. Stability for purposes of this objective is defined as:

- (a) Whether or not they changed majors from their initial selection
- (b) The number of times they changed majors

5. Compare a group of students who entered a research-extensive university in the southern portion of the United States with undeclared majors, completed the Career Discovery I career decision-making program during fall 2000, and declared a major by December 2000 with a group of students who entered the same university with declared majors and did not complete the Career Discovery I career decision-making program. The comparison will be made at the conclusion of the fourth semester (spring 2002) on the following demographic and academic measures:

- (a) Gender
- (b) Age
- (c) Race
- (d) High school academic GPA

- (e) College GPA
 - (f) ACT composite score
 - (g) On-campus housing
 - (h) Initial senior college entered
 - (i) Retention
 - (j) Number of scholarships
 - (k) Monetary value of scholarships
6. Compare the stability of choice of college major of a group of students who entered a research-extensive university in the southern portion of the United States with undeclared majors, completed the Career Discovery I career decision-making program during fall 2000 and declared a major by December 2000 with a group of students who entered the same university with declared majors and did not complete the Career Discovery I career decision-making program. The comparison will be made at the conclusion of the fourth semester (spring 2002). Stability for the purposes of this objective is defined as:
- (a) Whether or not they changed majors from their initial selection
 - (b) The number of times they changed majors
7. Determine if a model exists which explains a significant portion of variance in the stability of choice of college major from the following factors:
- (a) Gender
 - (b) Age
 - (c) Race

- (d) High school academic GPA
- (e) College GPA
- (f) ACT composite score
- (g) On-campus housing
- (h) Whether or not a senior college was entered
- (i) Initial senior college entered
- (j) Retention
- (k) Number of scholarships
- (l) Monetary value of scholarships
- (m) Whether or not they used Career Discovery I

This study was designed as an exploratory correlational study with personal and academic variables as the predictors. The predictor variables were gender, age, race, high school academic GPA, ACT composite score, on-campus housing, initial senior college entered, number of scholarships, and monetary value of scholarships. At the conclusion of the fourth semester, the cumulative college GPA and retention were included as variables. Stability of choice of college major was the criterion variable and was defined by whether or not there was a change in major after the initial declaration of college major and the number of changes in major.

The target population for this study was all first semester freshmen enrolled in research-extensive universities in the southern portion of the United States. The accessible population was first semester freshmen in University Center for Freshman Year at the Research-Extensive University at which the study was conducted. A sample of this accessible population was drawn using stratified random sampling

procedures. A sample of 300 freshmen who entered the University with declared majors and did not use Career Discovery I and a sample of 300 freshmen who entered as undecided, used Career Discovery I, and declared a major by December 2000 were selected. Enrollment data on freshmen including major from August 2000 and December 2000 were obtained from University Center for Freshman Year. Each subject remained anonymous through the assignment of a unique identification number; no names or identifying information were used.

Data on the specific descriptive and academic variables related to the objectives of this study were collected from the University's official records in the University's Measurement and Evaluation Center and the Office of Budget and Planning. From the Measurement and Evaluation Center, data maintained in the Student Information System (SIS) on the following variables were obtained: college, curriculum, gender, high school academic GPA, whether or not students used Career Discovery I, age, college GPA, retention, and ACT composite score. From the Office of Budget and Planning, data on the following variables were obtained from the Student Records and Registration database, the Student Financial Aid database, and the Student Housing database: race, on-campus housing, number of scholarships, monetary value of scholarships, whether or not an initial senior college was entered, initial senior college entered, last college as of May 2002, number of changes in college major, last term enrolled, and group (undecided or decided). Collection of data occurred at the beginning of the fall 2000 semester and at the end of the following semesters: fall 2000, spring 2001, fall 2001, and spring 2002.

Findings

Objective One

Findings for Objective 1 showed that students in the undecided group had the following demographic and academic characteristics. There were slightly more females ($n = 188$, 62.7%) than males ($n = 112$, 37.3%). The mean age of the undecided students was 18.30 with ages which ranged from 17.59 to 26.60. Regarding race, the largest group of undecided students were White ($n = 271$, 91.3%), followed by Asian, Hispanic and Black. High school academic GPAs ranged from 2.32 to 4.00 ($M = 3.3$). ACT composite scores ranged from 18 to 34 ($M = 24.1$). The group was almost evenly split regarding on-campus housing during their first year of enrollment, with 152 (50.7%) residing in on-campus housing and 148 (49.3%) living off campus. Of the group of undecided students, 141 (47.0%) had entered a senior college by the end of the fourth semester of investigation, and 159 (53.0%) had not entered a senior college. Of the senior colleges entered, the highest enrollment was in the College of Arts and Sciences ($n = 46$, 32.6%) and the College of Business Administration ($n = 26$, 18.5%). The mean number of academic scholarships awarded to the group of undecided students was 3.4. The number of scholarships most frequently received was four which 188 (62.7%) students received over the four semesters of investigation. The largest number received was 12, and 28 (9.3%) students received no scholarships. The mean dollars of scholarship monies received was \$5,038.05 which ranged from 0 to \$10,156. There were 28 (9.3%) students who received no scholarships.

Objective Two

Findings for Objective 2 showed that the students in the decided group had the following demographic and academic characteristics. The gender of the group of decided students was evenly divided, with 150 (50.0%) females and 150 (50.0%) males. The mean age of the decided students was 18.34 (almost the same as the undecided group of students) with ages which ranged from 17.04 to 24.82.

Regarding race, as with the undecided group, the largest group of decided students were White ($n = 248$, 82.7%), followed by Black, Asian, and Hispanic. High school academic GPAs ranged from 2.06 to 4.00, with the mean GPA (3.3), the same as the undecided group. ACT composite scores ranged from 18 to 33 ($M = 24.5$), almost identical to the undecided group. More of the group of decided students lived in on-campus during their first year of enrollment, with 165 (55.0%) residing in on-campus housing and 135 (45.0%) living off campus. Of the group of decided students, 144 (48.0%) had entered a senior college by the end of the fourth semester of investigation, and 156 (53.0%) had not entered a senior college. Again, this number was almost identical to the number of undecided students who had and had not entered a senior college by the end of the four semesters of investigation. Of the senior colleges entered, the highest enrollment was in the College of Basic Sciences ($n = 33$, 22.9%) and the College of Engineering ($n = 33$, 22.9%). The mean number of academic scholarships awarded to the group of decided students was 3.0. As with the group of undecided students, the number of scholarships most frequently awarded was four which 151 (50.3%) students received over the four semesters of investigation. The largest number awarded was 10, and 41 (13.7%) students received

no scholarships. The mean dollars of scholarship monies received was \$4,490.18 which ranged from 0 to \$10,556. There were 41 (13.7%) students who received no scholarships.

Objective Three

Findings for Objective 3 showed 161 (53.7%) of the undecided students did not change majors and 139 (46.3%) did change majors after the initial selection at the end of the first semester of investigation, fall 2000. Of the students who changed majors, 103 (34.3%) had one change, 33 (11.0%) had two changes, and 3 (3.0%) had three changes in major. The mean number of changes in major was .59 (SD = .72).

Objective Four

Findings for Objective 4 showed 132 (44.0%) of the decided students did not change majors and 168 (56.1%) did change majors after the initial selection of major on record as of August 2000. Of the students who changed majors, 105 (35.0%) had one change, 53 (17.7%) had two changes, 8 (2.7%) had three changes, and 2 (.7%) had four changes in major. The mean number of changes in major was .81 (SD = .87).

Objective Five

Findings for Objective 5 involved 11 variables on which the two groups of students were compared to determine if each variable was independent of the variable group (undecided or decided). An additional variable whether or not students entered a senior college by the end of the fourth semester of investigation was added because a relatively large number of students in each group had not entered a senior college. The Chi-square Test of Independence was used to compare

the two groups on the nominal variables gender, race, whether or not the students lived in on-campus housing their freshman year, whether or not students entered a senior college by the end of the fourth semester of investigation, the initial senior college entered, and retention (whether or not students were still enrolled by the conclusion of the fourth semester of investigation).

Of these variables, gender and race were the only two that were not independent. There was a significant difference in gender when the two groups were compared. The majority (62.7%) of the undecided group was female and the decided group had equal numbers of males and females (50.0%) each. Regarding the variable race, the undecided group had a higher percentage of White students (91.2% compared to 83.2% of the decided group), whereas the decided group consisted of a higher percentage of Black students (10.7% compared to 2.7% in the undecided group).

Each of the other four variables, whether or not students lived in on-campus housing during their freshman year, whether or not students entered a senior college by the end of the fourth semester of investigation, the initial senior college entered, and retention (whether or not students were still enrolled by the conclusion of the fourth semester of investigation) were independent of the variable group (decided or undecided) which indicates that there was no significant difference between the two groups.

The Independent t-test was used to compare the groups on the interval variables age, high school academic GPA, college GPA, ACT composite score, number of scholarships, and monetary value of scholarships. Of these six variables,

students in the two groups were found to be significantly different on only two of them: Number of scholarships and monetary value of scholarships. Students in the undecided group received a mean number of scholarships of 3.4, and the decided group received a mean of 3.0 scholarships. The undecided group was also found to have received a significantly higher monetary value in scholarships. The undecided group received a mean value of \$5,038.05 in scholarship funds while the decided group received an average value of \$4,490.18 in scholarship funds. When compared on age, high school academic GPA, college GPA, and ACT composite score, no differences were found between the undecided and decided groups of students.

Objective Six

Findings for Objective 6 showed that the two groups of students (undecided and decided) were significantly different when compared on the categorical variable whether or not there was a change in college major after the initial selection. The Chi-square Test of Independence indicated that the variables whether or not there was a change in college major after the initial selection and group were not independent ($X^2_{(1)} = 5.610, p = .018$). The majority of students in the undecided group who had used Career Discovery I did not change majors while the majority of students who entered the university with declared majors and did not use Career Discovery I did change majors. Of the undecided students, 161 (53.7%) did not change majors after the initial selection of a major while 139 (46.3%) had one or more changes in major after the initial selection. Of the decided students, 132 (44.0%) did not change majors after the initial selection while 168 (56.0%) had one or more changes in major after the initial selection.

When compared on the variable number of times students changed majors, students in the groups were found to be significantly different ($t_{(598)} = 3.326$, $p = .001$). Students who entered the University as undecided about a major had a mean number of changes in major of .59, while students who entered the University with declared majors (decided students) had a mean of .81 changes in major.

Objective Seven

Findings for Objective 7 showed that a model exists which explains a significant portion of the variance in the stability of choice of college major as measured by whether or not students changed majors and the number of times they changed majors for the following factors: (1) Gender, (2) Age, (3) Race, (4) High school academic GPA, (5) College GPA, (6) ACT composite score, (7) On-campus housing, (8) Whether or not a senior college was entered, (9) Initial senior college entered, (10) Retention, (11) Number of scholarships, (12) Monetary value of scholarships, and (13) Whether or not they used Career Discovery I.

After dummy coding two of the variables (race and initial senior college entered), the two groups were compared on 21 factors. Twelve variables entered the exploratory discriminant model for the dependent variable whether or not students changed majors after the initial selection. Five of the 12 variables tended to be associated with a decrease in the likelihood that students changed majors after their initial selection: Retention, whether or not students entered the College of Engineering, whether or not students used Career Discovery I, whether or not students entered the College of Agriculture, and whether or not students entered the

College of Mass Communication. The discriminant model correctly classified 64.2% of the cases analyzed.

Multiple regression analysis was used to determine if a model existed which explained a significant portion of the variance in the stability of college major choice as measured by the number of times students in the two groups changed majors. The results indicated that five of the 21 variables entered the regression model:

Retention, whether or not students used Career Discovery I, whether or not students entered the College of Engineering, whether or not students entered the College of Art and Design, and ACT composite score. These five variables explained 11.2% of the variance in the dependent variable. All of the remaining 16 independent variables were excluded from the model.

Of the variables that entered the regression model, the following characteristics tended to be associated with a decrease in the likelihood that students had changed majors after their initial selection: (a) students' completion of Career Discovery I, (b) the initial senior college entered as the College of Engineering, and (c) attainment of higher scores on the ACT composite measure. The remaining two variables that entered the regression model tended to be associated with an increase in the number of times that students had changed majors after their initial selection: (a) retention of students, and (b) the initial senior college entered as the College of Art and Design.

Conclusions, Implications, and Recommendations

Based on the findings of the study, the following conclusions, implications, and recommendations were developed:

1. Students who enter the University as undecided regarding their major are demographically different from those who enter with declared majors. This conclusion is based on the following findings of the study: The majority (62.7%) of the undecided group was female and the decided group had equal numbers of males and females (50.0%) each ($\chi^2_{(1)} = 9.784, p = .002$). The undecided group had a higher percentage of White students (91.2% compared to 83.2% of the decided group) while the decided group consisted of a higher percentage of Black students (10.7% compared to 2.7% in the undecided group) ($\chi^2_{(3)} = 18.428, p < .001$). Regarding scholarships, students in the undecided group received a mean number of scholarships of 3.4, and the decided group received a mean of 3.0 scholarships ($t_{(598)} = 2.531, p = .012$). The undecided group was also found to have received a significantly higher monetary value in scholarships. The undecided group received a mean value of \$5,038.05 in scholarship funds while the decided group received an average value of \$4,490.18 in scholarship funds ($t_{(598)} = 2.637, p = .009$).

This conclusion enlarges the body of knowledge on the characteristics of students who enter college undecided and decided about majors. Research to date has focused primarily on identifying factors which differentiate vocationally-decided from vocationally-undecided students. Some of the characteristics identified as differentiating factors in whether or not students are undecided or decided about college majors include ability, personality, anxiety, dependency, and self-esteem (Taylor, 1982). Additional

characteristics included vocational identity and perceptions of problem solving (Larson, Heppner, Ham, & Dugan, 1988), decision-making stages and style (Mau & Jepsen, 1992), parental relationship factors (Guerra & Braungart-Reiker, 1999), and self-efficacy (Bandura, 1982). Gordon (1994) noted that undecided students have been the subject of research studies for over 50 years and that many studies in the 1950s and 1960s tried to determine how undecided students were different from decided ones. She pointed out that when studying undecided students, many variables have been examined, such as abilities, values, anxiety, risk-taking, interest patterns, and parents' socioeconomic level, and few clear differences have emerged.

A thorough review of the literature over the past several decades failed to identify these four factors for differentiation between undecided and decided groups of students. Therefore, while the findings of the current study neither corroborate nor conflict with the existing literature, they add other potential characteristics as explanatory variables in understanding the factors that influence career decidedness among college-aged students. Based on this conclusion of the study, the researcher recommends further investigation to determine if gender, race, number and monetary value of scholarships continue to be significantly different for students grouped according to decidedness about college major. Finally, the number and monetary value of scholarships should be studied as factors possibly related to decidedness about college majors, especially in examining whether

receiving scholarships has an influence on decidedness or decidedness has an influence on scholarships.

2. The majority of students had not entered a senior college by the end of their fourth semester of enrollment, regardless of whether they were undecided or decided about college majors. This conclusion is based on findings which revealed that of the group of undecided students, 141 (47.0%) had entered a senior college by the end of the fourth semester of investigation, and 159 (53.0%) had not entered a senior college. Of the group of decided students, 144 (48.0%) had entered a senior college by the end of the fourth semester of investigation, and 156 (53.0%) had not entered a senior college.

This conclusion raises an issue of concern about the length of time students take to earn a degree in light of the associated expenses required to attend college. Meiners (2002) reported that according to the College Board, the average 2001-2002 tuition and fee cost for a four-year private college is \$17,123 per year (up 5.5 % from the previous year). For a four-year public college, the cost is \$3,754 per year (up 7.7 % from the previous year). These figures do not include the approximately \$5,000 per year in room and board costs for students living away from home. Students not admitted to a senior college by the conclusion of their fourth semester of enrollment are failing to make adequate progress in meeting degree requirements and most assuredly will spend more time in college to earn their degrees than most students

already enrolled in senior colleges and taking the courses needed to earn their degrees.

Related to the concern about the increasing costs of a college education the longer students take to earn their degrees are the problems caused at the research-extensive University at which this study was conducted when students fail to enter senior colleges. Effective fall 2000, students at this University are expected to reside in University Center for Freshman Year until they complete 30 hours (ideally in one year), and then they are expected to enter a senior college. Although they may remain in University Center for Freshman Year if they are undecided about a major until they have 45 hours, they must leave after that point and enter University Center for Advising and Counseling if they are unable or are not ready to enter a senior college.

The change in the length of time students may reside in University Center for Freshman Year has resulted in exponential growth in the number of students in University Center for Advising and Counseling. When the policy regarding residency in University Center for Freshman Year became effective in fall 2000, there were 2,081 students enrolled in University Center for Advising and Counseling. By the following fall semester (2001), enrollment in UCAC had increased to 3,426 students, a 64.6% increase. By fall 2002, enrollment in UCAC had increased to 4,249 students, a 104.2% increase since the policy became effective in fall 2000. The increasing counselor/student ratio is an issue of great concern. Only one additional

counselor was added in UCAC after fall 2000 to address the drastic increase in enrollment. It is difficult for counselors to meet the career decision-making needs of such a large number of students who are interested in a wide variety of college majors. Many of these students experience difficulty in making good decisions about careers and college majors and often have unrealistic expectations about meeting admission requirements into senior colleges of interest to them.

The researcher recommends that research should be conducted on the students who reside in University Center for Advising and Counseling.

While not all of the students in University Center for Advising and Counseling are undecided about college majors, many of them are undecided or may never meet the admission requirements of the senior colleges they hope to enter. Research is needed to determine the reasons undecided students have difficulty in making decisions about majors and in choosing majors when their chances of admission into the corresponding senior colleges of choice are slim. Two of the colleges, the College of Business Administration and the College of Mass Communication, require a 3.0 GPA for admission which is unattainable for many students who would like to be admitted to those colleges, and yet many students persist in making career plans based on completion of degree requirements in those two colleges. Additionally, research on the relationship between the length of time students reside in University Center for Advising and Counseling and their graduation

and drop out rates would be helpful in developing retention strategies for the University.

3. Students who entered the University as undecided about college majors, used Career Discovery I, and declared a major by the end of their first semester had a higher rate of retention after four semesters than students who entered the University as decided and did not use Career Discovery I. This conclusion is based on the findings that 258 (86.0%) of the students who entered the University as undecided about a major, used the program, and declared a major at the end of the first semester were still enrolled by the conclusion of the fourth semester while 42 (14.0%) were not enrolled. Of the group who entered with a declared major and did not use the program, 242 (80.7%) were still enrolled by the conclusion of the fourth semester while 58 (19.3%) were not enrolled.

This conclusion supports earlier research on the importance of effective career decision-making as related to college major selection. Several studies relate career indecision to retention. Titley and Titley (1985) presented support for the relationship between career indecision and attrition in their study of undecided students at Colorado State University. They found that the attrition rates of two groups of students (indecisive or undecided) were significantly and alarmingly higher than for students who had selected a major. After six years, 57% of those who switched majors during orientation and 61% of those who matriculated in the broad category of general studies never graduated and were no longer on the rolls. Boyd, Hunt, Stanley,

Magoon, and VanBrundt (1997) provided further support for the relationship between career decision-making and retention by recognizing that career clarity in undergraduate students has been shown to be related to retention and graduation. Their study of the retention rates of students in good academic standing shows that students in the treatment group who used a career testing and interpretation intervention had higher rates of retention than the comparison group for four semesters after the semester of intervention. These findings point to the importance of career decision-making early in the college experience. Hartman and Fuqua (1983) urged counselors to avoid routinely accepting or encouraging a student's tentativeness. Their caution was based on the significantly higher attrition rate for undecided as opposed to decided college students.

This researcher recommends further study on the reasons students drop out of college, including the relationship between dropping out and career indecision. For students who complete the Career Discovery I program and eventually drop out of college, factors such as their learning styles, career decision-making styles, levels of motivation, etc. should be studied to determine their role in the decision to remain undecided about majors and to fail to complete college. In addition, a follow-up study of the two groups of students in this study should be conducted at the conclusion of 12 semesters of enrollment to examine 4-year, 5-year, and 6-year graduation rates as related to the choice and stability of college majors.

4. Use of Career Discovery I had a positive impact on the stability of choice of college major. The findings regarding stability of choice of college major according to whether or not students changed majors reveal that 161 (53.7%) of the students who entered the University as undecided and used Career Discovery I did not change majors, while only 132 (44.0%) of the group that entered with declared majors and did not use Career Discovery I had no change in majors after the initial selection. The findings regarding the stability of choice of college major according to the number of times students changed majors reveal that of the students who used Career Discovery I and did change majors, 103 (34.3%) had one change in major, 33 (11.0%) had two changes in major, and 3 (1.0%) students had three changes in major. Of the group that did not use the program, 105 (35.0%) had one change in major, 53 (17.6%) had two changes in major, 8 (2.7%) had three changes in major, and 2 (.7%) had four changes in major.

Furthermore, findings in support of this conclusion are that the use of Career Discovery I entered both the discriminant model as a factor that made a significant difference in whether or not students changed majors as well as the regression model as a factor that made a significant difference in the number of times students changed majors. In the discriminant model, the use of Career Discovery I entered as the third of the five strongest significant variables with the greatest impact (-.54) on the dependent variable, whether or not students changed majors. In the regression model, the use of Career Discovery I entered as the second (.06) of the five strongest variables with

the greatest influence on the dependent variable, the number of times students changed majors.

This conclusion is supported by Gordon's (1994) belief that both students and their parents should view being "undecided" (in most cases) as a positive rather than a negative state. She claimed that students will not feel as pressured to decide before they are ready and will feel confident in the exploration process by using the excellent resources available to assist them in making stable and satisfying career decisions. Based on the findings of this study, Career Discovery I is one such resource.

This conclusion is further supported by Bertram's (1996) recognition of research that indicates most students with declared majors acknowledge some level of uncertainty or tentativeness. Bertram pointed out that deciding on a major requires a student to think for oneself about oneself, and that this is a significant challenge since most college students have just started making sense out of their lives. He claimed that deciding on a major may demand a developmental stage which some students have not yet reached.

This conclusion is also supported by Buescher, Johnston, Lucas and Hughey's (1989) finding that a one-time early college career intervention can result in a positive change for undecided freshmen. They reported that students who received early intervention were able to develop a clearer and more stable picture of their goals, interests, and skills. Their study documents the merits of providing a brief career intervention to impact the vocational identity of undecided college students early in their college

careers. Of particular note is their belief that given the sheer number of undecided students in college today and the possibility that their persistence and success with an academic career may be related to their vocational identity, an early intervention that proves successful deserves attention. As demonstrated by the findings in the current study, Career Discovery I has merit as an early intervention that has proved to make a difference in the vocational identity of its users.

This conclusion is further supported by Jurgen's (1986) study on the importance of early career interventions. As she noted, comprehensive programs and shorter term interventions can be effective in reducing career indecision and increasing career certainty. She suggested that interventions can be customized to fit the needs of an agency or organization and that even the most basic, cost-effective intervention may offer some relief to the undecided individual.

Based on this conclusion and the implications of the research supported by the findings of this study, the researcher recommends that the University administration require all students who enter the University, regardless of whether or not they have declared a major, to complete Career Discovery I. In addition, the researcher recommends that the University administration require students who are undecided after the first semester of enrollment to use Career Discovery II and Career Discovery III, the other two modules in the Career Discovery Program. Career Discovery II involves the use of Focus II, a computer-assisted career guidance program available in

Career Services and on the Internet, career exploration, and further development of the Career Plan. Career Discovery III involves taking an additional career assessment offered by Career Services, one or more career counseling sessions with counselors in Career Services, and further development of the Career Plan.

The findings of this study indicate that Career Discovery I has the capacity to positively impact the stability of college major choice. As a computer-assisted career intervention, this program allows ease of access from remote locations and the capability to provide career decision-making assistance to large numbers of students. In light of the large counselor/student ratio at most universities, the findings of this study support the use of Career Discovery I as an effective use of Web-based career technology. As Luzzo and MacGregor (2001) noted, the Internet and other technological advances have direct relevance to the practice of career counseling. As they suggested, rather than lagging behind in the application of technology in the profession, career counselors have forged ahead with the examination and consideration of various ways to harness the benefits of such technology in advancing the profession. Career Discovery I, as evidenced by the findings of this study, is a viable means of providing effective career decision-making assistance to university students.

The researcher also recommends that the current study be replicated with students who enter the University with declared majors and use Career Discovery I. This type of study would provide insight into whether or not

students who enter the University with declared majors still have more changes in major than students who enter undecided about college major. For those students who enter the University with declared majors, use Career Discovery I, and do not change their majors, the program would serve as a confirmation that they have selected stable majors that seemed to be good choices for them based on their career assessment and exploration. With the increasing use of computer-assisted career resources, Career Discovery I would be further evaluated for its effectiveness in assisting students in the process of career decision-making.

REFERENCES

- Anderson, B. C., Creamer, D. G., & Cross, L. H. (1989). Undecided, multiple change, and decided students: How different are they? *NACADA Journal*, 9(1), 46-50.
- Arroba, T. (1977). Styles of decision-making and their use: An empirical study. *British Journal of Guidance and Counseling*, 5, 149-158.
- Astin, A., Green, K., Korn, W., & Schalit, M. (1986). *The American freshman national norms for fall 1986*. American Council on Education.
- Austin, J. T., & Mahlman, R. A. (2000). Using the Internet for career-technical assessment: A pilot project in Ohio. *Journal of Career and Technical Education*, 16(2), 27-39.
- Baker, H. E. (2002). Reducing adolescent career indecision: The ASVAB career exploration program. *The Career Development Quarterly*, 50, 359-371.
- Bandura, A. (1982). Self-efficacy mechanisms in human agency. *American Psychologist*, 37, 122-147.
- Barrick, R. K., & Warmbrod, J. R. (1988, December). *Discriminant analysis*. Pre-session Seminar presented at the annual meeting of the American Vocational Association, St. Louis, MO.
- Bean, J. P. (1990). Why students leave: Insights from research. In D. Hossler, et al. (Eds.), *The Strategic Management of College Enrollments* (pp. 147-169). San Francisco: Jossey-Bass.
- Bergeron, L. M., & Romano, J. L. (1994, January). The relationships among career decision-making self-efficacy, educational indecision, vocational indecision, and gender. *Journal of College Student Development*, 35, 19-24.
- Bertram, R. M. (1996). The irrational nature of choice: a new model for advising undecided students? *NACADA Journal*, 16(2), 19-24.
- Blustein, D. L. (1989, March). The role of career exploration in the career decision making of college students. *Journal of College Student Development*, 30, 111-117.
- Boyd, P. (1988, October). *Career development needs of students*. Paper presented at the Annual Ohio Association for Counseling and Development, Columbus, OH. (ERIC Document Reproduction Service No. ED297251)
- Boyd, V., Hunt, P., Stanley, M., Magoon, T., & VanBrunt, J. (1997). *A low level career testing and interpretation intervention*. (Research Report No. 143). College Park, Maryland: Maryland University, College Park Counseling Center.

- Brown, F. (1981). Model education for the 1980s: Union of school, community, and family. *Urban Education, 16*, 361-373.
- Buescher, K. L., Johnston, J. A., Lucas, E. B., & Hughey, K. F. (1989). Early intervention with undecided college students. *Journal of College Student Development 30*, 375-380.
- Campbell, R. E., & Cellini, J. V. (1981). A diagnostic taxonomy of adult career development problems. *Journal of Vocational Behavior, 19*, 175-190.
- Chartrand, J. M., & Walsh, W. B. (2001). Career assessment: Changes and trends. In F.T.L. Leong & A. Barak (Eds.), *Contemporary Models in Vocational Psychology: A Volume in Honor of Samuel H. Osipow* (pp. 231-255). Mahwah, NJ: Erlbaum.
- Chickering, A. W. (1969). *Education and identity*. San Francisco: Jossey-Bass.
- Cohen, C. R., Chartand, J., & Jowdy, D. P. (1995). Relationships between career indecision subtypes and ego identity development. *Journal of Counseling Psychology, 42*, 440-447.
- Cooper, S. E. (1986). The effects of group and individual vocational counseling on career indecision and personal indecisiveness. *Journal of College Student Personnel, 27*, 39-42.
- Crites, T. J. (1981). Being "undecided" might be the best decision they could make. *The School Counselor, 29*, 41-46.
- Doolittle, A. E. (1981, August). Evaluation of an undergraduate advising program using multiple criteria. Paper presented at the Annual Convention of the American Psychological Association, Los Angeles, CA. (ERIC Document Reproduction Service No. ED393899)
- Dorn, F. (1987, March). Career counseling: A social influence approach. *Journal of College Student Personnel, 28*, 122-127.
- Engels, D. W., Minor, C. W., Sampson, J. P., Jr., & Splete, H. H. (1995). Career counseling specialty: History, development, and prospect. *Journal of Counseling and Development, 74*, 134-138.
- Eveland, A. P., Conyne, R. K., & Blakney, V. L. (1998). University students and career decidedness: Effects of two computer-based career guidance interventions. *Computers in Human Behavior, 14*, 531-541.
- Foote, B. (1980). Determined and undetermined-major students: How different are they? *Journal of College Student Personnel, 21*, 29-34.

- Forsyth, N., & Forsyth, D. (1982). Internality, controllability, and the effectiveness of attributional interpretations in counseling. *Journal of Counseling Psychology, 29*, 140-150.
- Fournier, G., & Jeanrie, C. (1999). Validation of a five-level locus of control scale. *Journal of Career Assessment, 7*(1), 63-89.
- Gati, I. (1986). Making career decisions - A sequential elimination approach. *Journal of Counseling Psychology, 33*, 408-417.
- Gati, I. (1994). Computer-assisted career counseling - Dilemmas, problems, and possible solutions. *Journal of Counseling and Development, 7*(1), 51-56.
- Gati, I. (1998). Using career-related aspects to elicit preferences and characterize occupations for a better person-environment fit. *Journal of Vocational Behavior, 52*, 343-356.
- Gianakos, I. (1999). Patterns of career choice and career decision-making self-efficacy. *Journal of Vocational Behavior, 54*, 244-258.
- Ginzberg, E. (1971). *Career guidance*. New York: McGraw Hill.
- Gordon, V. N. (1982). Are undecided students changing? *Vocational Guidance Quarterly, 30*, 265-271.
- Gordon, V. N. (Ed.). (1994). Issues in advising the undecided college student. *The Freshman Year Experience Monograph Series, 15*. (ERIC Document Reproduction Service No. ED375738)
- Gordon, V. N. (1995a). Undecided students: A population with special career decision-making needs. In E. A. Whitfield (Ed.), *Proceedings of the 1985 Counselor Education Career Development Workshop Series*. Columbus, OH: Ohio State Department of Education, Division of Vocational and Career Education. (ERIC Document Reproduction Service No. ED294059)
- Gordon, V. N. (1995b). *The undecided college student: An academic and career advising challenge*. Springfield, IL: Thomas.
- Gordon, V. N. (1998). Career decidedness types: A literature review. *The Career Development Quarterly, 46*, 386-403.
- Gordon, V. N., Coscarelli, W. C., & Sears, S. J. (1986). Comparative assessments of individual differences in learning and career decision making. *Journal of College Student Personnel, 27*, 233-242.

- Gore, P. A., & Leuwerke, W. C. (2000). Information technology for career assessment on the Internet. *Journal of Career Assessment*, 8, 3-19.
- Greenhaus, J. H., Hawkins, B. L., & Brenner, O. C. (1983). The impact of career exploration on the career decision-making process. *Journal of College Student Personnel*, 24, 495-502.
- Guerra, A. L. & Braungart-Reiker, J. M. (1999). Predicting career indecision in college students: The roles of identity formation and parental relationship factors. *The Career Development Quarterly*, 47, 255-266.
- Harris-Bowlsbey, J., Dikel, M. R., & Sampson, J. P., Jr. (2002). *The Internet: A tool for career planning*. Tulsa, OK: The National Career Development Association.
- Harris-Bowlsbey, J., & Sampson, J. P., Jr. (2001). Computer-based career planning systems: Dreams and realities. *The Career Development Quarterly*, 49, 250-267.
- Harris, S. A., Golden, B., & Olson, S. K. (1985). A workshop for undecided students. *Journal of College Student Personnel*, 26, 468-469.
- Hartman, B. W., & Fuqua, D. R. (1983). Career indecision from a multidimensional perspective: A reply to Crites. *School Counselor*, 30, 340-349.
- Heinzen, C., & Rakes, T. D. (1995). Enrollment management and career services: Translating concepts into practice. *Journal of Career Development*, 22(2), 117-123.
- Holland, J. L. (1996). Exploring careers with a typology: what we have learned and some new directions. *American Psychologist*, 51, 397-406.
- Holland, J. L., & Holland, J. E. (1977). Vocational indecision: More evidence and speculation. *Journal of Counseling Psychology*, 24, 404-415.
- Howland, P., & Palmer, R. (2000). Reshaping career development: Our future, our challenge. *Career Planning and Adult Development Journal*, 16(3), 35-41.
- Hoyt, K. B. (2001). A reaction to Mark Pope's (2000) "A brief history of career counseling in the United States". *The Career Development Quarterly*, 49, 374-379.
- Jepson, D. A. (1984). The development perspective on vocational behavior: A review of theory and research. In S. D. Brown & R. W. Lent (Eds.), *Handbook of Counseling Psychology*, New York: Wiley.
- Jones, L. K., & Lohmann, R. C. (1998). The career decision profile: Using a measure of career decision status in counseling. *Journal of Career Assessment*, 6, 209-230.

- Jones, W. P., Harbach, R. L., Coker, K. J., & Staples, P. A. (2002). Web-assisted vocational test interpretation. *Journal of Employment Counseling, 39*, 127-138.
- Jurgens, J. C. (2000). The undecided student: Effects of combining levels of treatment parameters on career certainty, career indecision, and client satisfaction. *The Career Development Quarterly, 48*, 237-250.
- King, P. M., & Gressard, C. P. (1979). *Persistence of students entering the University of Iowa in the fall of 1972: A five year retrospective study*. Unpublished manuscript, University of Iowa.
- Kirk, J. J. (2000). Web-assisted career counseling. *Journal of Employment Counseling, 37*, 146-159.
- Kivlighan, D. M., Johnston, J. A., Hogan, R. S., & Mauer, E. (1994). Who benefits from computerized career counseling? *Journal of Counseling and Development, 72*, 289-292.
- Korschgen, A. J., & Hageseth, J. A. (1997). Undecided students: How one college developed a collaborative approach to help students choose majors and careers. *Journal of Career Planning and Employment, 57*(3), 49-51.
- Krieshok, T. S. (2001). How the decision-making literature might inform career center practice. *Journal of Career Development, 27*, 207-216.
- Laker, D. R. (2002). The career wheel: an exercise for exploring and validating one's career choices. *Journal of Employment Counseling, 39*, 61-73.
- Larson, L. M., Heppner, P. P., Ham, T., & Dugan, K. (1988). Investigating multiple subtypes of career indecision through cluster analysis. *Journal of Counseling Psychology, 35*, 439-446.
- Levinson, E. M., Ohler, D. L., Caswell, S., & Kiewra, K. (1998). Six approaches to the assessment of career maturity. *Journal of Counseling and Development, 76*, 475-483.
- Lewallen, W. (1993). The impact of being "undecided" on college student persistence. *Journal of College Student Development, 34*(2), 103-112.
- Lewis-Beck, M. S. (1980). *Applied regression: An introduction*. Beverly Hills and London: Sage Publications.
- London, C. B., Lee, M. K., Manuele, A., & Caroline, A. (1985). Career decision-making: A fundamental goal for students in a post-industrial democracy. *College Student Journal, 19*, 283-287.

- Lucas, M. S., & Epperson, D. L. (1988). Personality types in vocationally undecided students. *Journal of College Student Development, 29*, 460-466.
- Lucas, M. S., & Epperson, D. L. (1990). Types of vocational undecidedness: A replication and refinement. *Journal of Counseling Psychology, 37*, 382-388.
- Luzzo, D. A. (1999). Identifying the career decision-making needs of nontraditional college students. *Journal of Counseling and Development, 77*(2), 135-140.
- Luzzo, D. A., & MacGregor, M. W. (2001). Practice and research in career counseling and development—2000. *The Career Development Quarterly, 50*, 98-140.
- Mau, W. C. (1995). Decision-making style as a predictor of career decision-making status and treatment gains. *Journal of Career Assessment, 3*(1), 89-99.
- Mau, W. C. (1999). Effects of computer-assisted career decision making on vocational identity and career exploratory behaviors. *Journal of Career Development, 25*, 261-274.
- Mau, W. C., & Jepson, D. A. (1992). Effects of computer-assisted instruction in using formal decision-making strategies to choose a college major. *Journal of Counseling Psychology, 39*(2), 185-192.
- McWhirter, E. H., Rasheed, S., & Crothers, M. (2000). The effects of high school career education on social-cognitive variables. *Journal of Counseling Psychology, 47*, 330-341.
- Meier, S. T. (1991). Vocational behavior, 1988-1990--Vocational choice, decision-making, career development interventions, and assessment. *Journal of Vocational Behavior, 39*(2), 131-181.
- Meiners, M. J. (2002). One size doesn't fit all in education planning [Electronic version]. *Indianapolis Business Journal, 22*(49), pp. 35-36.
- Miller, M. J. (1994). A circuitous test of Holland's theory. *Journal of Employment Counseling, 31*(3), 137-143.
- Miller, M. J. (2002). A longitudinal examination of a three-letter Holland code. *Journal of Employment Counseling, 39*, 43-49.
- Muskin, M. B. (1998). *Career counseling through the Internet*. (ERIC Document Reproduction Service No. ED424512)

- Nagle, R. A., & Bohovich, J. (2000). What goes into graduates' career decisions: A report on the 2000 graduating student and alumni survey. *Journal of Career Planning & Employment, 60*(3), 24-30.
- National Career Development Association. (1991). *NCDA ethical standards*. Retrieved June 12, 2002, from <http://www.ncda.org/about/poles.html>
- National Career Development Association. (1997). *NCDA guidelines for the use of the Internet for provision of career information and planning services*. Retrieved June 12, 2002, from <http://www.ncda.org/about/polnet.html>
- Niles, S. G., Erford, B. T., & Hunt, B. T. (1997). Decision-making styles and career development in college students. *Journal of College Student Development, 38*, 479-488.
- Niles, S. G., & Garis, J. W. (1990). The effects of a career planning course and a computer-assisted career guidance program (SIGI-PLUS) on undecided university students. *Journal of Career Development, 16*, 237-248.
- Noel, L. (1985). Increasing student retention: New challenges and potential. In L. Noel, R. Levitz, D. Saluri, et al. (Eds.), *Increasing Student Retention* (pp. 1-27). San Francisco: Jossey-Bass.
- Offer, M. (1997, March). *Supporting career guidance in the information society: A review of the use of computer-assisted guidance and the Internet in Europe*. Unpublished manuscript, Advice Guidance and Training, Winchester, United Kingdom.
- O'Halloran, T. M., Fahr, A. V., & Keller, J. R. (2002). Career counseling and the information highway: Heeding the road signs. *The Career Development Quarterly, 50*, 371-377.
- Oliver, L. W., & Chartrand, J. M. (2000). Strategies for career assessment research on the Internet. *Journal of Career Assessment, 8*, 95-103.
- Oliver, L. W., & Spokane, A. R. (1988). Career intervention outcome: What contributes to client gain? *Journal of Counseling Psychology, 35*, 447-462.
- Oliver, L. W., & Whiston, S. C. (2000). Internet career assessment for the new millennium. *Journal of Career Assessment, 8*, 361-369.
- Oliver, L. W., & Zack, J. S. (1999). Career assessment on the Internet: An exploration study. *Journal of Career Assessment, 7*, 323-356.

- Orndorff, R. M., & Herr, E. L. (1996). A comparative study of declared and undeclared college students on career uncertainty and involvement in career development activities. *Journal of Counseling and Development, 74*, 632-639.
- Osipow, S. H. (1999). Assessing career indecision. *Journal of Vocational Behavior, 55*(1), 147-154.
- Pope, M. (2000). A brief history of career counseling in the United States. *The Career Development Quarterly, 48*(3), 194-211.
- Prince, J. P., Chartrand, J. M., & Silver, D. G. (2000). Constructing a quality career assessment site. *Journal of Career Assessment, 8*, 55-67.
- Pyle, K. R. (2000). Career counseling in an information age: the promise of “high touch” in a “high tech” age. *Career Planning and Adult Development Journal, 16*(3), 7-29.
- Reardon, R. C., & Lenz, J. G. (1999). Holland’s theory and career assessment. *Journal of Vocational Behavior, 55*(1), 102-113.
- Reed, C. A., Lenz, J. G., Reardon, R. C., & Leierer, S. J. (2000). *Reducing negative career thoughts with a career course* (Technical Report No. 25). Tallahassee, FL: The Florida State University, The Center for the Study of Technology in Counseling and Career Development.
- Salomone, P. R. (1982). Difficult cases in career counseling. Part II: The indecisive client. *Personnel and Guidance Journal, 60*, 496-500.
- Salters, L. G. (1985). SIGI, values-based computer software: Its effect on undecided students. *Carolina View, 1*, 19-23. (ERIC Document Reproduction Service No. ED272133)
- Sampson, J. P., Jr. (1997). *Enhancing the use of career information with computer-assisted career guidance systems*. Retrieved January 9, 2002, from The Florida State University, The Center for the Study of Technology in Counseling and Career Development Web Site: <http://icdl.uncg.edu/ft/050699-01.html>
- Sampson, J. P., Jr. (1999a). Effective design and use of internet-based career resources and services. *IAEVG (International Association for Educational and Vocation Guidance) Bulletin, 63*, 4-12.
- Sampson, J. P., Jr. (1999b). Integrating Internet-based distance guidance with services provided in career centers. *The Career Development Quarterly, 47*, 243-254.
- Sampson, J. P., Jr., & Lumsden, J. A. (2000). Ethical issues in the design and use of Internet-based career assessment. *Journal of Career Assessment, 8*, 23-35.

- Sampson, J. P., Jr., Peterson, G. W., & Reardon, R. C. (1989). Counselor intervention strategies for computer-assisted career guidance: An information-processing approach. *Journal of Career Development, 16*, 139-154.
- Sampson, J. P., Jr., & Reardon, R. C. (1998). Maximizing staff resources in meeting the needs of job seekers in one-stop centers. *Journal of Employment Counseling, 35*, 50-68.
- Savickas, M. L., Silling, S. M., & Schwartz, S. (1984). Time perspective in vocational maturity and career decision making. *Journal of Vocational Behavior, 25*, 258-269.
- Schein, H. K., & Laff, N. S. (1997). Working with undecided students: A hands-on strategy. *NACADA Journal, 17*(1), 42-48.
- Sepich, R. (1987). A review of the correlates and measurements of career indecision. *Journal of Career Development, 14*, 8-23.
- Simms, J. J. (1983). *Academic and vocational decision-making patterns among academically undecided college freshmen*. Unpublished doctoral dissertation, University of California, Los Angeles.
- Spokane, A. R. (1991). *Career intervention*. Englewood Cliffs, NJ: Prentice-Hall.
- Spokane, A. R., & Oliver, L. W. (1983). Outcomes of vocational intervention. In S. H. Osipow & W. B. Walsh (Eds.), *Handbook of Vocational Psychology* (pp. 19-136). Hillsdale, NJ: Erlbaum.
- Strong, S. (1982). Emerging integrations of clinical and social psychology: A clinician's perspective. In G. Weary & H. Mirels (Eds.), *Integrations of clinical and social psychology* (pp. 181-213). New York: Oxford Press.
- Super, D. E. (1980). A life-span, life-space approach to career development. *Journal of Vocational Behavior, 16*, 282-298.
- Taber, B. J., & Luzzo, D. A. (1999). *A comprehensive review of research evaluating the effectiveness of DISCOVER in promoting career development* (ACT Research Report 99.3). Iowa City, IA: ACT.
- Taylor, K. M. (1982). An investigation of vocational indecision in college students: Correlates and moderators. *Journal of Vocational Behavior, 21*, 318-329.
- Titley, R. W., & Titley, B. S. (1985). Initial choice of college major and attrition: The "decided" and the "undecided" after six years. *Journal of College Student Personnel, 26*, 465-466.

- TypeFocus Internet Inc. (2002). *Program information for TypeFocus™ Careers*. Retrieved June 6, 2002, from <http://careers.typefocus.com/company.html>
- Whiston, S. C. (2002). Application of the principles: Career counseling and interventions. *The Counseling Psychologist, 30*, 218-237.
- Whiston, S. C., Sexton, T. L., & Lasoff, D. L. (1988). Career-intervention outcome: A replication and extension of Oliver and Spokane. *Journal of Counseling Psychology, 45*(2), 150-165.
- Wood, F. W. (1995). From best intentions to best practices: Conference programme and proceedings of the annual Canadian-American conference on the first-year experience. *Proceedings of the Canadian-American Conference on the First-Year Experience*, Toronto, Canada, 1-126.
- Zagora, M. A., & Cramer, S. H. (1994). The effects of vocational identity status on outcomes of a career decision-making intervention for community college students. *Journal of College Student Development, 35*, 239-247.
- Zytowski, D. G. (1977). Vocational behavior and career development. *Journal of Vocational Behavior, 13*, 141-162.

APPENDIX: VARIABLES IN THE DATA SET

Variables in the Data Set

1. Gender: Female = 0, Male = 1.
2. Age: continuous data for the age of students from date of birth in days, months, and years as of August 1, 2000.
3. Race: White = 1, Asian = 2, Black = 3, Hispanic = 4.
4. High school academic GPA: continuous data for the grade point average computed on a 4.0 scale based on the 17½ units in high school academic courses recommended by the University for admission.
5. ACT composite score: continuous data based on ACT composite score.
6. On-campus housing: No = 0, Yes = 1.
7. Initial Senior College entered: Arts & Sciences = 1, Art and Design = 2, Agriculture = 3, Business Administration = 4, Basic Sciences = 5, Education = 6, Engineering = 7, Mass Communication = 8, Music & Dramatic Arts = 9.
8. Number of scholarships awarded: continuous data for scholarships awarded over the four semesters of investigation.
9. Monetary value of scholarships: continuous data for the monetary value of scholarships awarded over the four semesters of investigation.
10. Whether or not students changed majors: No = 0, Yes = 1.
11. Number of times students changed majors: 0 = 0, 1-4 = 1.
12. Retention: enrolled through end of spring 2002; No = 0, Yes = 1.
13. Whether or not students used Career Discovery I: Yes = 0, No = 1.

14. College GPA: continuous data for grade point average computed on a 4.0 scale for courses taken during the four semesters of investigation.
15. If senior college: whether or not students entered a senior college by May 2002:
No = 0; Yes =1.
16. Group: Undecided = 1, Decided = 2.

VITA

Mary D. Feduccia was born in 1949 and lived in Waveland, Mississippi, until her graduation from St. Joseph's Academy in Bay St. Louis, Mississippi, in 1967. She earned a Bachelor of Arts degree in 1971 in education with a major in English and a minor in psychology at the University of Southwestern Louisiana in Lafayette, Louisiana. She taught English and psychology at Iberia Senior High School in New Iberia, Louisiana, from 1972 through 1974. During this time she earned a Master of Education degree in guidance and counseling at the University of Southwestern Louisiana. She has been a Licensed Professional Counselor since 1987.

In 1974 she married Michael J. Feduccia and moved to Baton Rouge, Louisiana. She worked as a guidance counselor and served as chair of the Guidance Departments at St. Joseph's Academy from 1974--1979 and at Bishop Sullivan High School from 1986--1997. She spent the time between 1979 and 1986 at home with their three young children, Ashley, Michael, and Allison.

In 1997 Mary accepted the position of Associate Director of Career Services at Louisiana State University in Baton Rouge, Louisiana, and was appointed Director in 2000. She is active at Louisiana State University in campus activities and serves on several University committees. She is also active in several professional organizations and serves as President-Elect of the Louisiana Career Development Association. In May 2003 she will receive the Doctor of Philosophy degree in vocational education with a special emphasis in career leadership and workforce education at Louisiana State University. Her hobbies include stained glass, gardening, and reading.