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Major Field Change of College Students: Academic and Sociological Correlates

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MAJOR FIELD CHANGE OF COLLEGE STUDENTS:

ACADEMIC AND SOCIOLOGICAL CORRELATES

by
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This Dissertation submitted by Dawn R. Rorvig in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota has been read by the Faculty Advisory Committee under whom the work has been done, and is hereby approved.

(Chairperson)

This Dissertation meets the standards for appearance and conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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Signature Dawn Borvig

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ABSTRACT

Purpose

The purpose of the study was to identify academic and sociological correlates which may determine specific student populations showing tendencies to change major fields.

Procedure

The research sample (N = 597) consisted of University of North Dakota students who were first-time, full-time students in the 1982 fall semester and who continued enrollment through or graduated by the 1986 spring semester. These students also had an ACT composite score on record.

Selected information was obtained from the Student Profile Section of the American College Test (ACT) Assessment, the Student Information Form of the Cooperative Institutional Research Program, and the Student Record System of the University of North Dakota. Change of major was defined as a change between two academic majors characterized by changes in major codes on the Student Record System. For those students who were undecided upon initial enrollment, the change from

"undecided" to the first academic major declared was not considered a change of major.

Conclusions

1. Students who were undecided upon initial enrollment changed majors significantly fewer times than students who were decided.

2. There were no significant relationships between change of major frequency and students' self-professed indications of sureness of major and occupational choices, need for assistance in deciding educational and vocational plans, and chance of changing major field and career choices.

3. Students from smaller graduating classes or with lower high school grade point averages made significantly more changes of majors than students from larger graduating classes or those with higher grade point averages. However, the size of the graduating classes and the grade point averages explained minimal variance in change of major frequency.

4. No significant relationships were found between change of major frequency and parental levels of education, previous work experience, vocational coursework studied, high school academic rank, and ACT composite score.

5. Students with more frequent major changes had significantly lower cumulative grade point averages and earned less credit hours than

students changing less frequently. However, change of major frequency explained minimal variance in cumulative grade point averages and credit hours earned.

CHAPTER I

INTRODUCTION

Background of the Study

Many college freshmen have entered college with what they thought were clear academic plans. Upon enrollment they identified a major area of study, were assigned an academic advisor in their respective major area, and pursued a prescribed course of subject matter. Literature review, however, has indicated that large percentages of students have changed their major field at least once during their academic careers.

The study of the change of major phenomena has not been new to research in higher education. However, the precipitating factors which have influenced the research and its direction have varied over the past years. In the late 1960s and early 1970s, due to the maturing of the 1947-1950 postwar babies, institutions were faced with rapid increases in student populations. This expansion in the sheer number of students only amplified concerns which already existed about career development in college students (Berger, 1967). Consequently, research on career development issues intensified.

The study of migration between majors was stimulated in the 1960s. Akenson and Beecher (1967) gathered data from the 1965 Harvard graduating class and found 61% had changed their majors during their college careers. They attributed the majority of changes to students leaving the natural sciences for the social sciences or the humanities. They speculated that the shift out of the natural sciences was largely due to the high school and college curricula differences. The high school curriculum emphasized natural sciences, whereas the college liberal arts curriculum opened up a new area of study for students and became quite popular in relation to the rising social conscience of the time.

Not only did the number of students grow and the curriculum expand during the late 1960s and early 1970s, but the occupational world increased in complexity as well. The number of occupational possibilities made it even more difficult for college students to confidently choose their careers. Subsequently, students were changing majors in their efforts to find a course of study that would lead to an occupation they desired.

From the mid 1970s to the present, many institutions have experienced a decline in both college enrollments and financial resources. In an effort to make the most efficient use of their resources, these institutions have been involved in self-assessment procedures that have focused on examining what students are actually doing in relation to

their academic progress through college. Foote (1980) described the situation in this manner:

> Across the nation, institutions of higher education are facing a double bind of limited financial resources and decreased student enrollments. Either problem by itself is cause for deep concern because either has the potential for leading to inadequate operating funds and a downward spiral of institutional vitality. The occurrence of the two together, with no sign of a trend reversal in the near future, had led colleges and university personnel to seek new perspectives on how to manage in steady-state or declining resource situations. Such new perspectives in management include changes in the way academic and support programs are evaluated. The current need is to go beyond evaluation in terms of the quality of work done and to ask questions about the essentiality of the programs to the mission of the institution. Faculty chairpersons and staff directors alike are caught by the change in evaluation criteria. The old output indicators are no longer sufficient to answer the penetrating questions of essentiality of function, and it is not totally clear what new data will be needed to support the claim of integral importance and worth. Given the centrality of student learning and student retention to the mission of any college or university, however, part of the new data base that seems to

be called for is an assessment of the students who use the programs. (p. 29)

Learning about a career, choosing a career, and becoming employable in the workforce historically have been the primary reasons why young adults attend college. Consequently, the choices of careers and academic majors have been studied in relation to students' adjustment within school. Gamble (1962) expressed his concern about the college success and adjustment of students. He indicated that vocational maturity and curriculum certainty were factors related to a student's college adjustment. He researched the relationship between selected pre-college, out-of-school, personal experiences and number of curriculum changes made during a three semester period. His study found that nearly 44% of the sample population made at least one major change after admission to the university.

The high percentages of students who have changed majors have been evident throughout the research. Feldman and Newcomb (1969) summarized several studies (most of them longitudinal) which established that, with a few exceptions, between one-third and two-thirds of the students in the samples of the studies changed their career choice or choice of major field. Furthermore, as addressed earlier, most of the changes resulted in migration from the "hard" sciences to social sciences and business. More recently, Foote (1980) conducted a two year investigation which tracked arts and sciences students who had entered

a university in the fall of 1975. It was demonstrated that, "87% of the students who started school with a specified major changed their major at least once during the next two years" (p. 33).

Purpose of the Study

The purpose of this study was to identify academic and sociological variables which may help to determine specific student populations experiencing greater tendencies to change academic major fields.

Several researchers have recognized the need to study the change of major phenomena. Elton and Rose (1966) stated, "the high incidence of within-university transfer and the lack of substantial knowledge about the phenomena, suggests that this is an area worthy of investigation" (p. 539). Titley and Titley (1980) found "a dearth of precise and meaningful research on the prevalence and determinants of why college students change majors" (p. 293). Elliot (1984) noted that "few studies of career maturity, change of major, and academic achievement were concentrated on college students beyond their freshmen year" (p. 411).

The need to examine change of majors among students has been identified. If specific academic and sociological variables are related to major field changes, a student profile may be constructed. This would allow university personnel to identify groups of students which may be in the greatest need of specific career development services. Moreover, if a profile is established, those students who would likely experience

greater difficulties in choosing a career could be identified in the secondary schools, thus allowing greater time for career development efforts.

Research Hypotheses

The present study will address the following research hypotheses:

Research Hypothesis 1. There will be no significant difference in the frequency of major change between those students who initially declare "undecided" and those students who initially choose an academic major.

Research Hypothesis 2. There will be a significant relationship between students' indications of their sureness of major and occupational choices and number of major changes made.

Research Hypothesis 3. There will be a significant relationship between students' indications of their need for assistance in deciding educational and vocational plans and change of major frequency.

Research Hypothesis 4. There will be a significant relationship between students' predictions of changes in major field and career choices and actual changes in major field.

Research Hypothesis 5. There will be significant relationships between change of major and the following selected academic, demographic, sociological variables: parental levels of education, work experience and number of years studying vocational-occupational

coursework, high school grade point average, high school rank, number of students in high school graduating class, and the ACT composite score.

Research Hypothesis 6. Students who change majors more frequently will have lower grade point averages and earn less credit hours than those changing majors less frequently.

Delimitations

This study involved following change of major activity of those students who initially enrolled at the University of North Dakota as full time students (12 or more credits) during the 1982 fall semester. These students were followed through the 1986 spring semester. Students who withdrew from the University prior to or during the 1986 spring semester were not included within the study.

Limitations

1. This study was limited to the accuracy of the University records maintained on the Student Record System and obtained through the Office of Student Affairs and the Registrar's Office.

2. The study population was limited to those students who completed the American College Testing (ACT) Assessment and Student Profile Section and the American Council on Education (ACE) Student Information Form.

3. The study population did not include some students who registered as first-time, full-time students in the 1982 fall semester but either (a) did not attend any classes and were administratively dropped from such classes, (b) attended only a few days and then withdrew, and/or (c) did not pay fees and were administratively dropped from enrollment.

4. From the Student Record System, changes in major codes were only considered at the beginning of each fall and spring semester. Changes in majors made during other times were not addressed by this study.

5. The study was limited to the accuracy with which the students completed the ACT, ACE questionnaires.

6. Information on every variable for each member of the study population was not available.

7. Since all subjects in this study are affiliated with the same university, the generalizability of the results may be limited.

Definition of Terms

American College Test (ACT) Assessment: The ACT Assessment includes four academic tests in English, math, social studies, and natural sciences, and an interest inventory. Information obtained from the ACT Assessment is used to assist students with career and educational decisions, provide institutions with student admission and

enrollment data, help college personnel place students in appropriate courses and programs, help identify students who may benefit from special programs, and to help colleges examine and improve their educational programs.

American Council on Education (ACE): Founded in 1918, the American Council on Education is a council of educational organizations and institutions whose purpose is to advance education and educational methods through comprehensive, voluntary and cooperative action. It established the Cooperative Institutional Research Program (CIRP) in 1966.

American Council on Education (ACE) Student Information Survey: The ACE survey is sponsored by the Cooperative Institutional Research Program (CIRP) of the University of California, Los Angeles, and the American Council on Education. The survey instrument, the Student Information Form (SIF), consists of academic, demographic, and personal information (e.g., attitudes, goals) items. Information gained through students' responses to these items provides a picture of college freshmen that can be used for administrative research and counseling purposes.

Attrition: A term referring to any student who leaves a university prior to earning a degree.

Change of Major: Change of major will be defined as a change between two academic majors as characterized by change of major codes on the Student Record System. This definition excludes the first change

from "undecided" to the declaration of an academic major by those students who were undecided upon initial enrollment. That is, a student who initially declares a major of undecided and then declares another major (e.g., accounting) has not made a major change until he switches to another academic major. An alternate definition of change of major, which incorporates the first change from "undecided" to an academic major, will be addressed in the ancillary findings.

Cooperative Institutional Research Program (CIRP): Established in 1966 by the American Council on Education (ACE), this program is a national longitudinal study of the American higher education system. It is administered by the Laboratory for Research on Higher Education at UCLA.

Full-Time Student: A student who is enrolled for a specified number of credit hours. At the University of North Dakota, a student must be enrolled for 12 credit hours to be considered full-time.

General Education Requirements: This term refers to a specified number of credit hours a student is to complete in certain disciplines (e.g., mathematics, arts and humanities) as identified by the college or university. The goals involved in requiring such broad coursework include developing cross-disciplinary abilities (e.g., critical thinking, effective communication), and disciplinary abilities (e.g., understanding human behavior, scientific technology).

Major: This term generally refers to the field of specialization (e.g., nursing) a student chooses to pursue. The specific requirements of a major are determined by the department or program responsible for the major. Generally, the bulk of the student's coursework, above and beyond the General Education Requirements, is related to his major field.

Part-Time Student: This term refers to any student who is not enrolled in the sufficient number of credit hours (generally 12 credit hours) to be considered full-time.

Retention: A term which refers to students who have continued attending the institution in which they first enrolled.

Withdrawal: This term may refer to the withdrawal from one course, or the discontinuing of enrollment (dropping all classes) during a term. Withdrawal from a college or university generally involves a formal procedure requiring a form and signatures.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

The Implications of Declaring the Academic Major

> For the college-bound late adolescent, one of the first major decisions relating to issues of purpose, identity, and life goals is encountered in the selection of an academic major. Responding to the question of "What's your major?" becomes a principal means of communicating about self to family and peers, and for the student who has not yet selected an academic major, admission of confusion or doubt in that respect may be tantamount to an admission of identify diffusion. (Brown & Strange, 1981, p. 329)

As Brown and Strange (1981) suggested above, the action of declaring an academic major by students seems to "demystify" the students' futures; that is, students' lives suddenly "take shape" and certain expectations regarding future happenings are established. These expectations are based on the belief that the students who have declared their majors have well developed self-identities that enable them to know who they are, the career goals they want to fulfill, and the steps they will take to fulfill them; whereas, students who are unable to select

their majors are likely to feel anxious and guilty because they may be perceived by others as having poorly developed self-identities.

The social undesirability of not being able to make a choice of career or academic major prior to or at the beginning of college, has been addressed in the literature. One study (Weitz, Clarke, & Jones, 1955) found that students who declared specific majors were better prepared for college. Men, in particular, who declared a major were found to do better academically than those men who did not. Thus, at that time, it was recommended that admission officers who had to choose between two equally good candidates, should have selected the one with a specified major. Adamek and Goudy (1966) discussed the negative cost to society in terms of the students' time, monies, and talents as well as the inefficient use of educational facilities. Gamble (1962) cited Super as suggesting that a student's vocational selection process be guided "to make the choice more economical, psychologically and materially so that the individual as well as society would profit from the reduction of the amount of floundering which characterizes the early experiences of young people" (p. 561). Gartman (1971/1972) stated the following:

> Indecision on the part of college students in choosing an academic major is costly to the students and to the institutions which they attend. A change of major often results in loss of credit hours to the students involved, which in turn means that they must spend extra time in earning a degree. With the

> prospect of a need for longer and longer periods of formal education in today's complex society, an early and secure choice of educational and occupational goals would seem to be important both for the individual and for society. (p. 6)

The negative consequences of instability of major choice and career indecision have been identified. However, overwhelmingly the literature has refuted the expectation that students are able to declare stable choices of majors at the onset of their college careers. Titley and Titley (1980) presented their views as follows:

> It has been our experience that all too often many parents, college administrators, faculty, counselors, and academic advisors . . . seem to assume that a student's selection of specific major represents a fully crystallized choice rather than a mere manifestation of the normal trial or exploratory phase of this developmental span . . . . Unfortunately, numerous factors operate in unintentional opposition to the developmental needs of students in their early college years. Some parents seem to expect their 17-year-old offspring to know what they want to become vocationally, especially if they are going to embark on a financially burdensome four years of college. The perceptions of some faculty and administrators is that undeclared status and the high rate of major change reflect either academic ineptness or

> negative indecisiveness rather than a normal development progression. (pp. 293, 297)

In the preceding statement, Titley and Titley (1980) briefly addressed the issue of the developmental needs of students in their first college years. In the following statement, Burck (1984) reaffirmed the developmental needs of all people in relation to career progression:

> People today seem to know little about themselves as people, their feelings and fears, their prejudices or preferences, their strengths and weaknesses, and they do not have an accurate understanding of their behavior. They desperately want to understand and become aware of these personal characteristics and attributes, sort them out in meaningful ways, and relate them to career progression. (p. 11)

The literature has indicated that the developmental needs of students are often erroneously considered of secondary importance to societal needs. Cultural and societal forces are believed to affect career aspirations of youth (Astin, 1967). This seemed especially true regarding students' perceptions of the relationships between academic majors and their eventual employment. As Eike (1982) stated, "In today's industrialized American society, the choice of a college major is a first and often crucial step in the choice of employment" (p. 4). Again, this belief has been repeatedly disputed by those who recognized the developmental needs of the student. Faulting society with pressuring

students to make premature career choices, Berger (1967) discussed these needs as follows:

> The pressure is based on an erroneous and misleading assumption, namely, that most college freshmen are able to make a lasting and satisfactory vocational choice as freshmen or soon thereafter. The assumption is erroneous because most college freshmen have not yet learned, and will not learn in a short time, what they need to know about themselves and about occupations in order to make a first, satisfactory vocational choice. The assumption is misleading because it creates the impression that the student's vocational task is merely one of "choosing" a vocation, cafeteria style, rather than a potentially lifelong task of vocational self-discovery which may reasonably include many vocational choices, especially in the process of discovering a satisfactory occupational field. In a sense, the assumption requires that the freshman be omniscient, that he foresee his future experience and development, that he predict what his eventual vocational choice will be before he has had the experience and undergone the development out of which satisfactory choices emerge. In response to the pressure to make a definite vocational choice, many students commit themselves prematurely. They tell the world [what] they are going to be . . . before they know whether they can handle the required subjects, before they know whether

> they have the required talents or special aptitudes, before they know what the training is actually like, before they have an idea of how much they would like the day-to-day work possible in their chosen field. (p. 889)

Titley and Titley (1980) attributed vocationalism with pushing students toward "early and sometimes unwise or capricious major choices, including choices based solely on the syndrome of 'where the jobs are'" (p. 297). Van Wey (1977) expressed similar concern regarding students viewing a college degree as yielding "a 'meaningful' position upon graduation . . . [and being] most concerned with acquiring the credentials needed to apply for a job . . . not associating the process with gaining the skills necessary to enter a particular career area" (p. 31).

Snodgrass (1984) observed that the premise behind vocationalism--that college majors are structured to prepare students exclusively for a specific occupation--was a widely held, but erroneous assumption of many college students. He stated:

> Most college majors do not specifically relate to or provide specific preparation for a particular set of occupations. College majors are usually academic disciplines that may be applicable to a broad spectrum of occupations. The curriculum requirements of academic majors are designed to expose the student to the

> major concepts and issues of the field rather than to fulfill the entry requirements for a particular job. (p. 151)

Similarly, in defense of permitting and encouraging students to have the flexible educational movement not allowed by vocationalism, Warnath (1977) argued that the choice of a college major and eventual occupation were not as closely related as many believe because often college graduates were employed in jobs unrelated to their college majors. As Dole (1963) succinctly expressed fourteen years earlier, "Educational choice is not vocational choice!" (p. 30).

Studies Related to Change of Major

This section of the Review of Literature will focus on studies related to changes of majors by students. The following issues will be specifically addressed: change of major activity, characteristics of students who change majors, and factors influencing stability of major choice. It is important to note some considerations concerning the studies. The methodological procedures varied greatly between the studies. Also, the studies differed in their use of categorical groupings of majors when they defined what constituted a change of major. Some used major subject areas or colleges (e.g., engineering, business); others used specific majors (e.g., business administration); and some used both major subject areas and specific majors. The studies were longitudinal, ex post facto, or both. The reader is encouraged to refer

to the actual studies for more specific detail of methodological procedures.

Change of Major Activity

It has been suggested that a relationship exists between the developmental process involved in students' career decisions and the tentativeness of their choices, especially their initial choices. As Titley and Titley (1980) indicated:

> The high incidence of college undergraduates who change majors is, however congruent with and predictable from the notions of several vocational theorists . . . who either state directly or imply that career choice, of which major choice is perhaps a reflection, is an ongoing developmental process . . . only a very small proportion of college-bound students are both subjectively certain of their initial major choice and continue in that major for a two year period. (p. 296)

Numerous studies have been conducted that substantiate the tenuous nature of the students' initial choices of majors. Snodgrass (1984) noted that "studies on the stability of college major selection indicate that between 50% and 90% of students who select majors as freshmen eventually change majors" (p. 150). Similarly, Feldman and Newcomb (1969) summarized studies of students' stability of choices of careers and major fields. They claimed that "with only a few exceptions,

between one-third and two-thirds of the students in the samples of these studies change their choice of career or their choice of major field" (p. 37). Several of these studies will be addressed in the following paragraphs.

In Phase I of a three phase Preference Change Study at Michigan State College, Matteson (1951) examined the frequency of changes in curriculum preference of students enrolled in Basic College. Curriculum preference changes originated with the students' counselors in the Counseling Center. Data concerning the changes were collected and tabulated. It was shown that "about 50 per cent of the graduating seniors have changed preference at least once and . . . well over 50 per cent of the students change at least once during their freshman and sophomore years" (p. 259).

Working with data collected by the Center for the Study of Higher Education at the University of California, Warren (1961) followed 525 male National Merit Scholars from their entrance into college, through the spring of their sophomore years. He found that 245 of the National Merit Scholars, or approximately 47% of the group studied, had changed majors. Furthermore, it was revealed that of the 245 subjects, 41 changed twice.

For three consecutive semesters, Gamble (1962) analyzed the curriculum choices of college freshmen who were enrolled as full-time students, beginning with the fall semester of 1957. He concluded

"nearly 38 per cent of the students made one change and 5.6 per cent made two or more changes . . . over 43 per cent of the total population made one or more curriculum changes" (p. 562).

Of the 2,369 Michigan State University candidates for bachelor's degrees in June, 1958, 30% (734) applied to graduate in majors other than those originally chosen upon entrance to the university (Pierson, 1962).

Cole, Wilson, and Tiedman (1964) found that 41% of a group of 759 men, admitted to the College for Men of the University of Rochester during the years 1948-1951, changed fields prior to graduation. They also examined a group of 774 students who entered Harvard during the period 1946-1949. Of this sample, only 27% of the students changed fields of concentration.

Thirty-two percent, or 632, of the 1,995 students who entered Auburn (Alabama) University in the summer and fall quarters of 1959 changed majors at least once during the time period from summer, 1959, to fall, 1962. The average number of changes for the group was 1.2 (Cook, 1965).

Carmody, Fenske, and Scott (1972) conducted a study which consolidated and compared information from two- and four-year follow-up studies of high school seniors who had completed the Student Profile Section (SPS) of the American College Testing (ACT) Assessment. The SPS was described as a "short biographical inventory which asks

prospective college students about their home background, their educational and vocational plans, their goals in attending college, and their interests and achievement in out-of-class areas" (p. 2). In particular, the SPS included a question which requested students to report their proposed major fields of study.

The two-year follow-up study used a national sample of junior college students who completed the SPS in 1965 and were completing their second year of college in the spring of 1967. The study showed that 43.8% of the males, and 52.5% of the females reported the same major after two years. Overall the percentage for both males and females was 47.3%. The four-year follow-up study included students from 64 four-year colleges and universities. All of these students were freshmen in September, 1965. In this study, 37.1% of the males and 52.4% of the females indicated a consistent choice of major (Carmody et al., 1972).

In another two-year study (Foote, 1980), it was reported that of the 1975 fall freshmen students (1,351) who declared a specific major within the College of Arts and Sciences at the University of Colorado at Boulder, 87% made at least one change of major by the fall of 1977.

Titley and Titley (1980) assessed the changes of majors made by 2,451 freshmen at Colorado State University (CSU) during their 1977 "Preview CSU" summer orientation program. The midsummer, month-long orientation program involved orienting, advising, and registering

approximately 120 students per day. At the beginning of each day of orientation, the students were classified into one of the following categories of major status, according to the academic majors they indicated on their applications: (a) General Studies--included those unsure of field of study or major; (b) College Undecided--included those who chose one of four university colleges offering such a temporary status, but undecided as to a specific major; and (c) Specific Major--included those able to declare a specific major within a college. At the end of the orientation program, it was found that 18% of those students (2,451) participating students changed their originally declared status during the program.

The target group of Titley and Titley's (1980) study was those students who appeared to be most decided about their major. These were the 648 freshmen who "indicated on application a specific major, who held to that choice throughout the orientation process, who registered for appropriate classes in that major, and who reported a high degree of certainty about their choice during orientation" (p. 294). The degree of certainty was measured by students' subjective responses on questionnaires that requested self-judgments about certainty of major selections. These students were followed for two years, from the 1977 fall semester until the 1979 spring semester. Of the 578 students who were still in school at the end of the 1979 spring semester, 110, or almost 17%, of the reportedly most "decided" group changed majors.

Thus, out of the 648 high-certainty students, "only 468 or 72% remained in their initially selected major through the end of two years. These 468 students are less than 20% of the entire summer orientation freshman group of 2,451 students" (p. 296).

Further analysis by Titley and Titley (1980) resulted in the conclusion that freshmen registrants who felt unsure about their selection were more likely to change majors. In comparing the high-certainty and low-certainty groups of students who had selected specific majors at orientation, it was found that only about one-third of low-certainty students were in the same major at the end of two years. This percentage was markedly lower than the 72% of high-certainty students who remained in the same major.

The final study (Theophilides, Terenzini, & Lorang, 1984) to be addressed in this section of the literature review had findings similar to previously cited studies which supported the prevalence of major changes by students. During the 1978 summer orientation program at a large, highly selective, public residential university in New York State, 2,147 prospective freshmen completed the "1978 Student Information Form" developed by Alexander Astin and his associates and available through the Cooperative Institutional Research Program (CIRP). The Student Information Form requested a variety of information from the student, including academic and career plans. Of the students who enrolled at the University in the fall of 1978, 1,360 completed a usable

questionnaire. Later these students were sent a questionnaire in April of 1979. On this questionnaire they were asked to provide information about their attitudes and freshman-year experiences. Four hundred sixty-nine usable questionnaires were returned and these respondents were again surveyed in April of 1980. Of the 308 usable responses, it was found that 77% of the students had changed their major field during their first two college years. Additional analysis revealed that decided and undecided students did not differ significantly in the amount of major changes made.

Research has attributed the first two years of college with most change of major activity. Most specifically it has been suggested that "the second year seems to be the typical time for students to alter their academic and career related goals based on their college experiences (Elliot, 1984, p. 39). In examining change of major activity of 403 seniors at Michigan State University, Pierson (1962) substantiated that 29% changed from their original major in their freshman year, 45% in their sophomore year, 26% in their junior year, and two students changed during their senior year. Franklin (1970/1971) found 45% of the major changes he studied occurred in the sophomore year, with the largest percentage (23%) occurring in the fourth semester. Of the 625 students studied by Titley, Titley, and Wolff (1976), who changed from one degree-granting program to another, 19.4% were freshmen, 35.8% were sophomores, 31.7% were juniors and 13.1% were seniors.

Finally, related to the frequency of major change issue were the findings of Krupka and Vener (1978), Condron (1979), and Theophilides et al. (1984). Krupka and Vener followed Michigan State University students who initially declared a major upon entrance to college and those who did not declare a major preference and were placed in a "no-preference" category. They stated, "No-preference students have an average of 1.2 major changes during their undergraduate college careers whereas students with declared majors as entering freshmen change an average of three times" (p. 113). Condron and Theophilides et al., however, found no significant difference between frequency of major change for those students who were decided and those undecided about major choices.

Characteristics of Students Who Change Majors

Students' pre-enrollment characteristics (such as demographic background, high school experiences, sex, and personality characteristics, including values, attitudes, goals, and skills) and their relationship to change of major activity have not been extensively studied. The studies which have addressed such issues were limited not only in their number, but also in the variation of pre-enrollment characteristics that have been investigated. Few statistically significant relationships between change of major activity and

pre-enrollment characteristics have been reported. Also, findings from the various studies have been contradictory.

An example of these contradictory findings came from research on the pre-enrollment variable, high school rank. Matteson (1953) examined high school rank as it related to changes of majors by Michigan State students (1,091) over a two year period. A larger percentage of the group of students who changed majors had been ranked in the top quartile of their high school graduating classes than in any other quartile. In contrast, Astin and Panos (1969) observed that students with superior academic high school records, reflected by average grades in high school, were more likely to make stable choices of majors. Their finding was based on data collected from a national sample of freshmen at 246 institutions. Achieving comparable findings, Eike (1982) also reviewed high school rank and other academic achievement variables associated with students who were enrolled at the University of Missouri--Columbia during the period of 1975-1979. Eike constructed an empirical model that predicted a student was more likely to change majors if he was at a comparative disadvantage in academic ability within the initial major selected (all other factors being equal). Although the model had small explanatory power, the following was found:

> The probability of switching from one major group to another increases as the grade point average, the high school rank, and the high school graduating class size of an individual falls below

the average values of these variables for the students choosing the same initial major group. (p. 77)

Eike (1982) also examined the relationship between entry test scores (i.e., SAT, SCAT, ACT) and change of major frequency. Contrary to what was predicted, these scores did not have a significant relationship with the probability of switching majors.

Foote (1980) found no relationship between high school grade point average and frequency of major changes. Similarly, Gamble (1962) did not identify a relationship between high school rank and number of curriculum changes made by students (1,095) at the Pennsylvania State University. Nor, in his study of 61 pre-college variables, did he find relationships between change of major frequency and the following: pre-college work experience, high school extra-curricular activities, interest area, rank among siblings, marital status, parents' marital status, languages spoken in the home, father's education and occupation, and size of high school graduating class.

Gamble (1962) cited only three pre-enrollment variables significantly related to number of major changes made by male students. These included the attitudes of parents toward their sons attending college, ages of male students, and certainty of vocational choice. He stated his findings as follows:

A larger percentage of those whose parents were insistent about college made two curriculum changes than did those whose parents

> were favorable but not insistent . . . more than twice the percentage of those whose parents were favorable made no curriculum changes than did those whose parents were insistent about college . . . the older, and perhaps more mature students, made fewer curriculum changes . . . of those who indicated uncertainty in their vocational choice, only a few did not make at least one curriculum change. (pp. 563-564)

Even though only three pre-college variables, of the 61 variables studied, were statistically significant. Gamble (1962) reported these relationships:

> Students, whose mothers had one or two years of education after high school, seemed to make more changes than those whose mothers had more than 14 years of education or less than 12 years of education . . . . Fewer changes were made by those students whose mothers were working outside of the home than by those whose mothers worked either part-time or full-time [sic] . . . . More changes were made by students who had no siblings than those who had more than one sibling. (p. 564)

In regard to parental levels of education, Astin and Panos (1969), like Gamble (1962), found neither the father's nor mother's level of education to be significantly related to change of major activity.

Contrary to earlier findings (Matteson, 1953), Carmody et al. (1972) viewed females as being more consistent than males in their

choice of majors. In two- and four-year studies based on data collected in the mid 1960s, 52.5% and 52.4% of the females as opposed to 43.8% and 37.1% of the males made stable major choices respectively. Commenting on the greater stability of choices of majors by females, Carmody et al. suggested that the females tended to have more stable choices because "a far more restricted range of fields were initially open and attractive to this sample of females . . . the restrictions are self-imposed and are a product of deep-rooted and pervasive social pressures regarding 'appropriate' academic studies and occupations for women" (pp. 11-12). Titley et al. (1976) also found women were more stable with their choices of majors. Again, in contradiction, Eike (1982) observed that the probability of switching majors increased for female students.

Focusing more on students' self-perceptions, Gartman (1971/1972) sampled 378 seniors from six Arkansas state supported schools. Among the pre-enrollment factors studied, students' self-perceptions of their certainty and seriousness about major choice selection had a significant relationship with change of major frequency. "Non-changers" were more certain and serious about their initial major choices. These findings are comparable to the previously addressed findings of Gamble (1962). Students' self-perceptions of their academic preparedness for college were not found to be associated with frequency of change of major. Although not statistically significant, two other pre-enrollment factors,

lack of adequate information about initially chosen majors and inadequate parental guidance, reflected some relationship with change of major activity. That is, "changers" indicated they had less adequate information about initial major choices and poorer parental guidance than did non-changers.

Factors Influencing Change of Major

A prevailing concern frequently mentioned in the literature was that students did not have adequate information or utilized misinformation when they decided their initial choices of majors (Barak, Carney, & Archibald, 1975; Franklin, 1970/1971; Pierson, 1962; Thistlethwaite, 1960). Burck (1984) expressed the confusion surrounding this lack of information in the following statement:

> More than ever before, people find the problems of choosing and maintaining themselves in a career as confusing and intricate. They are confronted with a seemingly ever-increasing array of opportunities from which they might choose. Yet many find themselves with little reliable and valid information and knowledge about the general nature of the work world, much less with comprehensive knowledge of specific job areas or the career planning process. Sorely lacking for most people are up-to-date specific and accurate labor forecasts and predictions. (p. 11)

Some students have chosen majors about which they knew very little, resulting in disinterest and dissatisfaction with the original major (Gartman, 1971/1972). Franklin (1970/1971) analyzed reasons given by students for changes in their areas of study. Grades, loss of interest, and dislike for the field of study accounted for 70% of all changes. He interpreted these findings as indicating that students may be entering college with very vague ideas about what is involved in the course of study they initially pursue. As Theophilides et al. (1984) indicated, it may not be until the student has experienced the curriculum opportunities, course content, and academic demands of the major field chosen that he begins to understand that field.

The implication that many students are not well informed regarding their initial choices of majors has often been attributed to perceived limitations in the career development experiences of beginning college students. These limitations were substantiated in one nationwide study (Prediger, Roth, & Noeth, 1977) which assessed the career development of 8th, 9th, and 11th grade students in public and Catholic schools. Through the analysis of responses to the Assessment of Career Development (ACD), a paper-and-pencil inventory which focused on core components of career development (e.g., occupational awareness, self-awareness, career planning and decision making), the following was evidenced:

> [Twenty] per cent of the nation's 11th graders exhibit what can only be called a very low level of involvement in career planning activities. Another 50 per cent barely approach a minimally desirable level . . . . [Students] show both a lack of knowledge and a substantial amount of misinformation. . . . If we were speaking of physical development rather than career development, we would describe American youth as hungry, undernourished, and physically retarded. (p. 174)

Career development has been described as an ongoing developmental process which continues throughout an individual's lifetime (Ginzberg, 1971; Goodson, 1978). It is the developmental nature of career development that may be one contributing factor to the change of major activity (Titley & Titley, 1980). College may be the first setting in which concentrated efforts to select a major and career are made. Many beginning students may not have the information or the skills necessary to make a career or major choice. As Barak et al. (1975) stated:

> Failing to make a vocational selection during late adolescence when it is developmentally appropriate to do so, or making an unrealistic choice, may be due to a lack of information, the usage of inaccurate information, or a developmental skill deficiency. Presumably, the dissonance created by these situations will be lessened when the individual is exposed to further personal assessment, accurate occupational information,

and the opportunity to learn appropriate developmental skills. (p. 150)

Not only may lack of career development experience affect a student's ability to stably declare a major choice, but the impact of college on a student may significantly alter perceptions of the self and society. These self-perceptions, in turn, affect vocational choices. Referring to the freshman's adjustment process to college as "culture shock," Theophilides et al. (1984) indicated that "the college freshman is confronted with a new social system that involves both desocialization (unlearning past values, attitudes, and behavior patterns) and socialization (learning and participating in a new culture)" (p. 262). The adjustment process also has been purported to involve identity confusion (Elton & Rose, 1966) and a period of environmental discontinuity (Titley et al., 1976), which may particularly affect students from rural or small-town environments (Feldman & Newcomb, 1969).

With respect to the relationship between change of major activity and the college-student adjustment process, particular focus has been on the interaction of student personality traits and college characteristics. However, the research is unclear as to what specific interactional dynamics were operating when students changed majors. It has been suggested that students sought environments consistent with their personality characteristics (Elton & Rose, 1966; Theophilides et al.,

1984; Walsh, Spokane, & Mitchell, 1976). Associated with this belief has been the "birds of a feather" theory. This theory purported that when a student changes majors, he matches himself to the characteristics of other students in the major field to which he is moving, causing greater homogeneity within each major and greater hetereogeneity between major fields (Kojaku, 1971; Werts & Watley, 1968). This belief has its basis in a theory formulated by Holland and researched by Holland and Nichols (1964). The theory proposed that students sort themselves into fields congruent with their personal traits, aptitudes, interests, and achievements. On the other hand, it has been suggested that students' personalities (i.e., attitudes and values) change as a result of the new experential base derived from college (Theophilides et al., 1984). As Watley and Werts (1969) expressed, "the 'birds' may change their 'feathers'" (p. 259). Relatedly, Astin (1967) reviewed effects of different college environments on career choice and stated, "the more heterogeneous and inconsistent the college environment, the greater the number of career shifts among the student body" (p. 541).

One factor of personality, students' self-identities or self-concepts, has not been identified as independently related to change of major activity. Warren (1961) completed a study which hypothesized that major field changes were likely to occur when a discrepancy existed between a student's self-concepts and the occupational role associated with the initial major field. He did not find support for this hypothesis,

and suggested that if a relationship did occur, it may have been masked by other variables (e.g., freshman year grade point average) related to change of major activity. Contrary to their hypothesis, Adamek and Goudy (1966) indicated that students with strong self-concepts were as likely to switch majors as those with weak self-concepts. Their findings suggested that:

> A person might have a strong self-concept, but find himself in the wrong major and thus desire to switch . . . . [Also] persons with weak self-concepts might be likely to remain in majors they first choose, since they have nothing more definite in mind so far as their occupational plans are concerned. (p. 190)

Adamek and Goudy (1966) disclosed a more significant relationship between change of major activity and the degree (i.e., high or low) to which students identified with their chosen majors (as measured by students' responses on a constructed "Identification with Major" scale). From their study of 372 junior class students from a large midwestern university, Adamek and Goudy observed that "74 per cent of low identifiers were switchers, compared to 26 per cent of high identifiers" (p. 198). Addressing the influence of a student's identification with his major, combined with his self-concept, they inferred that a student who identified highly with his major was likely to have had a strong self-concept, "[but when] combined with low identification, a strong self-concept 'prompts' the individual to change majors" (p. 191).

In examining the relationship between change of major activity and the discrepancy a student perceives between his self-concept and the occupational role expected (in the major field he initially chooses), an additional finding was that students who change majors had lower grade point averages than those who remained in their initially chosen fields (Warren, 1961). Other studies revealed similar conclusions (Marks, 1970), although many reported non-significant relationships (Cook, 1965; Elliot, 1984). One study (Titley et al., 1976) revealed no significant difference in the cumulative grade point averages of the "changers" in comparison with the grade point averages of all of the undergraduate students. Of the studies which revealed markedly higher grade point averages for "non-changers," grade point averages were examined through the spring of the sophomore year (Warren, 1961), or at the time of transfer (within the first three quarters of attendance) (Marks, 1970). In contrast, in the studies finding no significant differences, cumulative grade point averages were examined over longer time periods, and not specifically at or around the time when changes of majors were made (Cook, 1965; Elliot, 1984; Titley et al., 1976). It may be interpreted that poor academic performances influenced students' decisions to change majors. However, once having changed majors the students did better academically and the cumulative grade point averages were comparable between "changers" and "nonchangers." As Osipow (cited in Titley et al., 1976) proposed, changes in major fields or

careers may not have reflected modified preferences but, instead, may have reflected achievement problems. On the other hand, Marks (1970) viewed changes of major as a student's effort to self-actualize his abilities and values. He stated:

> Change of program should involve certain cognitive activities by the student relevant to this choice--for example, evaluation of one's academic ability, motivation, and performance relative to the constraints of an academic program, like the level of its academic standards and competition. Especially important in this respect is how these activities relate to or interact with those educational and vocational endstates or goal which the student considers relevant. It may be that the act of transfer is prompted in many cases by uncrystallized cognitive or reward structures, or a system of extrinsic rewards that fails to commit the student to a particular education-vocational choice. (p. 2)

In a related manner, Marks (1970) identified students' commitment to their programs as factors distinguishing "changers" from "non-changers." Students remaining in their initial programs of study had higher scores on the "Program Commitment" and "Program Involvement" variables. The program commitment variable examined the students' perceived satisfaction with their program, the length of time they had been sure of their program choices, and their perceived chances of transferring to another program. The "Program Involvement" variable addressed the

students' estimates of their knowledge about their programs and how frequently they participated in activities related to their programs. Theophilides et al. (1984) also found that students who exhibited higher commitment to personal goals and to the institution, were less likely to change major fields. They undertook a longitudinal study involving students who completed the "1978 Student Information Form" (through the Cooperative Institutional Research Program); they also sought information from freshmen and sophomores follow-up questionnaires. These instruments solicited a variety of information including students' perceptions of their likelihood to change major fields or career choices, and their attitudes and freshmen- and sophomore-year experiences in the academic, intellectual, and social areas.

Self-esteem was found to be positively related to occupational exploration, value clarity, and satisfaction with a career decision in a study conducted by Greenhaus, Hawkins, and Brenner (1983). Their study surveyed types of career exploration (which included occupational exploration, family and friends, self-exploration, and employment) and their relationships with a student's satisfaction with a career decision. Occupational exploration, self-exploration, and employment were related to satisfaction with a career decision. Self-exploration was the only type of career exploration factor found to predict satisfaction with the career decision, when background characteristics were controlled in the analysis. Even though the data reinforced the self-exploration factor

(which included activities involving test taking, counseling, and attendance at career development seminars), participation was lower than for most of the other activities. The most popular form of career exploration, consultation with family members and friends, was not related to the development of a career decision. As Greenhaus et al. (1983) stated, "the most extensively used exploratory activities are not necessarily the most effective vehicles for planning a career" (p. 501).

Greenhaus et al. (1983) found consultation with family members and friends to be the most popular, but least influential of the career exploration activities studied. Considering the influence of others in helping students with their decision to change majors, Franklin (1970/1971) cited the largest percentage (20%) of the 280 students involved in the study, sought assistance from a professor. Seventeen percent, 16% and 12% sought assistance from other students, parents or relatives, and the assistant dean, respectively. Only 9% utilized the Counseling and Testing Center.

Regarding faculty or fellow students' influences as being a possible reason for a student's desire to change majors, Gartman (1971/1972) suggested that "attitudes and influences of faculty and fellow students play a relatively small role in affecting student stability in a major field of study" (p. 16). Gelso and Sims (1968) expressed the concern that the usefulness of matching students and advisors on the basis of the students' intended majors, is dependent upon the stability of the major

choice. Grites (1981) contended that faculty should be more supportive of students, especially when advising undecided students. He stated, "unless otherwise informed and directed, most faculty advisors capitalize on the knowledge of their disciplines but fail to encourage exploration into other potential major fields of study" (p. 42).

In addition to faculty and peer influences, the characteristics of the institution may have an influence on major choice stability. As Krupka and Vener (1978) stated:

> Some may argue that a large number of major changes is indicative of growth on the part of an undergraduate. We are not in disagreement with this view. We feel that current programs, procedures, and organizational structures in most large universities, however, are haphazard and inefficient in regard to facilitation of a student's final career choice. Too much is left to chance. (p. 112)

Also Dressel and Simpson (1980) discussed the issue of a college's influences on changes of majors by students. They stated:

> Intervening changes between the initial choice and last recorded one are ignored in this analysis because they unduly complicate the process. . . . Some researchers feel that the intervening changes in major are, if anything, more indicative of student dissatisfaction than the first major change, the reason being that the first switch reflects only the correction of a freshman's

> uninformed and unrealistic initial choice of a major whereas later changes express the disappointment of an experienced student. (pp. 59-60)

Dressel and Simpson (1980) also faulted institutional procedures with hindering students from changing majors. Suggesting students may get caught within institutional "power plays," they expressed the following:

> Changes in major that require a student to initiate the process with a major adviser may cause the timid or uncertain individual to defer change or withdraw from college rather than risk a confrontation. Procedures requiring multiple signatures (and hence multiple explanations) may be time consuming, productive of delay, and conducive to unpleasant experiences . . . change procedures often seem to be fabricated so as to cause delay and discomfort . . . . Personalities, requirements, convenience, and a hidden agenda of power balancing often play more critical roles in academic structures than does student career concern. (pp. 61-62)

Attrition may be related to stability of major choice. In their longitudinal study of freshmen enrolled at 246 four-year colleges and universities in the fall of 1961, Astin and Panos (1969) found over "40 percent reported that they dropped out of college because they had changed their career plans or wanted time to reconsider their interests and vocational goals" (p. 30). Schmidt and Sedlacek (1972) studied

variables related to student satisfaction within a university. They noted the "most dissatisfied students were those indicating a difficulty in choosing a major field or career" (p. 235). Similarly, Hecklinger (1972) observed undecided students were less satisfied with their college environments (i.e., faculty, administration, major, students) than were decided students.

In a study conducted at Boston College (Lonabocker, 1982), questionnaires were mailed to students who had withdrawn during the 1977-1978 academic year. Students who had resided on campus indicated that their unsureness of career goals was a major reason for leaving college, a reason secondary only to the unavailability of specific majors or courses they desired. A study of Arizona State University (Churchill & Iwai, 1981) identified "uncertainty about a college major" as one of the four problem areas that distinguish those high-academic performing students who persisted from those who voluntarily left. Those students who withdrew assigned greater importance to experiencing uncertainty about a major than did those students who persisted. Not all research indicated a relationship between attrition and major choice instability. Pantages and Creedon (1978) reviewed college attrition studies conducted during the time span of 1950 to 1975. They reported inconsistent support for the premise that a vocational goal is conducive to persistence. They suggested the

inconsistent findings could be "a reflection of inadequate measures of the strength of vocational goals and interests" (p. 68).

Career Development Theories

Throughout the preceding literature review, research related to change of major activity was addressed. Within this research, specific factors reported to have an influence on change of major behavior included: (1) the relationship between personality and choice of major, (2) the development and implementation of self-concept or self-identity, (3) the developmental nature of career decision, and (4) the influence of pre-enrollment experiences on career decision. These factors have their basis in specific career development theories which can be simplistically grouped into theories of occupational choice, theories of career development, and theories of career decision making (Brown & Brooks, 1984). These theories will be briefly addressed in the following paragraphs.

One theory of occupational choice proposes that people seek occupations with requirements and characteristics that are congruent with their personality traits, particularly in relation to their interests and aptitudes (this type of theory is often referred to as "trait and factor" theory). Numerous researchers cited in the literature review acknowledged this relationship between students' personality characteristics and their environments, as represented by major fields of

study or occupations (Elton & Rose, 1966; Kojaku, 1971; Theophilides et al., 1984; Walsh et al., 1976; Werts & Watley, 1968).

One variation of this trait and factor theme can be attributed to Holland who theorized that "people project their views of themselves and the world of work on to occupational titles" (Osipow, 1983, p. 82). In other words, people attempt to match their self-perceived interests and abilities with the requirements, skills, and lifestyles thought typical of specific occupations. Holland identified six occupational orientations (realistic, investigative, social, conventional, enterprising, and artistic) he thought were representative of major lifestyles and individual/world interactive patterns. Of these six orientations, the most typical way an individual responds to his environment is his modal personal orientation (Osipow, 1983).

Holland's theory provides indirect explanation for the previously reported findings of Holland and Nichols (1964). They found that students who remained in a particular field of study resembled the typical student in that field in terms of aptitudes, achievements, and personality. Conversely, students leaving a field had dissimilar attributes than those of the students in their initial choices of fields. These findings may suggest that certain types of students are more compatible with certain types of fields of study or environments. Those who were more compatible with their environments tended to be more stable with their choices of majors.

Another trait and factor model, Davis' "birds of a feather theory" was examined by Watley and Werts (1969). This theory, like Holland's, has suggested that there is a trend toward social homogeneity among students; specifically, "changers are seen as trying to match their 'traits' with the 'right' career field" (Watley & Werts, 1969, p. 254). Watley and Werts did not find evidence to support Davis' theory.

Change of major was also discussed as being related to the student's development and implementation of his self-concept or self-identity (Adamek & Goudy, 1966; Elton & Rose, 1966; Marks, 1970; Warren, 1961). Super views career choice as a "process of compromise within which the development and implementation of the self-concept operates. Individuals function in roles that are consistent with their self-concept. This self-concept, in turn, is a function of the person's developmental history" (Amatea, 1984, pp. 32-33). This theory was supported by Adamek and Goudy (1966) who found that students who highly identified with their majors did not switch majors as frequently as those students who were low identifiers.

Super's theory addresses the developmental nature of career development, another factor considered to influence change of major activity as reported in the literature review (Barak et al., 1975; Burck, 1984; Goodson, 1978; Titley & Titley, 1980). Influenced by Super, Tiedman and O'Hara have also addressed the developmental nature of career development. They emphasized the process of decision making,

specifically accentuating individual purpose and responsibility--key components of career development not addressed in Super's theory (Tiedman & Miller-Tiedman, 1984). They viewed the decision process as comprised of distinct stages, each described in terms of the "individual's conceptualization of him/herself, of the choice task, and of oneself in the choice process . . . [environmental discontinuities] present the individual with problems to be resolved, in which success results in the individual gaining an increased sense of self-competence and control over his/her behavior and environment" (Amatea, 1984, p. 37).

Finally, the review of the literature also addressed the relationship between change of major behavior and students' past experiences (Burck, 1984; Carmody et al., 1972; Eike, 1982; Franklin, 1970/1971; Gamble, 1962; Gartman, 1971/1972; Pierson, 1962; Prediger et al., 1977; Thistlethwaite, 1960). Krumboltz's social learning theory of career selection specifically addresses this relationship. Krumboltz's theory suggests that "career preferences, occupational skills, and an individual's selection of educational experiences, occupations, and fields of work are both the composite and consequence of many past and present experiences and the cause of anticipation of future experiences" (Amatea, 1984, p. 39). The past, present, and future experiences are classified into the two broad categories of "environmental" and "psychological" factors which include genetic endowment, environmental

conditions, past learning experiences, and abilities to cope with the environment (e.g., goal setting skills).

In summary, the brief review of the preceding career development theories does not in any way begin to give a comprehensive view of career development. Four basic theories were addressed in an effort to illustrate how career development theories influence the consideration of change of major behavior.

Summary

In Chapter II is presented a review of the literature related to the nature of this study. The implications of declaring an academic major were addressed as were studies which focused on various issues associated with change of major behavior. These issues included change of major activity, characteristics of students who change majors, and factors influencing stability of major choice. Career development theories were also briefly reviewed. The literature review indicated that students have experienced undue societal pressure to declare academic majors early in their college experiences in order to become quickly and productively employable in the workforce. It was also suggested that students have felt internal pressure to declare majors early because indecision has been thought to reflect poorly developed self-identities. Some researchers contended that students were developmentally unable to make stable choices of majors as they did not have adequate

experiences to do so. This contention appeared to be supported by the high frequency of change of major behavior that was cited in the literature.

Findings pertaining to the relationship between various factors (i.e., pre-enrollment, academic, and sociological variables) and change of major activity were generally contradictory in nature and therefore, inconclusive. Several of these variables will be examined within the present study.

Chapter III will describe the procedures used to conduct this research study.

CHAPTER III

DESIGN OF STUDY

This chapter summarizes the manner in which this study was conducted. It provides information regarding the research population, the sources of data, variables included in the study, procedures followed, and the statistical analyses utilized.

Research Population

The research population was drawn from first-time, full-time students at the University of North Dakota during the 1982 fall semester (N = 1,482). Students who continued their enrollment through or graduated within the time span between fall semester, 1982, and spring semester, 1986, and who had an ACT composite score were used as the research sample (N = 597).

Sources of Data

Three separate sources of data were used in this study, all of which were obtained through the Registrar's Office and the Office of Institutional Research at the University of North Dakota.

The first source of data was the American College Test (ACT) Assessment results for individual students. This data was procured from the Office of Institutional Research at the University of North Dakota. All students entering a state college or university in North Dakota are required to take the American College Test unless they have completed and furnished the scores from the Preliminary Scholastic Aptitude Test (PSAT) or the Scholastic Aptitude Test (SAT).

The ACT Assessment instrument consists of a battery of four academic tests (English, math, social studies, and natural sciences) and a Student Profile Section and Interest Inventory. The ACT Assessment results used for this study were the ACT Composite Score (average score of the four academic tests) and selected responses from the Student Profile Section. The Student Profile Section requests information about admission and enrollment plans, academic and out-of-class high school achievements and aspirations, and high school coursework. The student is also asked to report high school grades in the four subject matter areas covered by the academic tests, and provide biographical data (American College Testing Program, 1981).

The second source of information consisted of selected responses from the Student Information Form (SIF) used by the Cooperative Institutional Research Program (CIRP). The CIRP is an ongoing national longitudinal study of the American higher educational system. It was established by the American Council on Education (ACE). The SIF

requests standard biographic and demographic information from the student.

A third source of data was the computerized Student Record System maintained by the Office of Admissions and Records at the University of North Dakota. The data included information pertaining to a student's demographic characteristics and college academic record.

Information on each variable from the three sources of data was not available for every student.

Variables

The variables included in this study were selected on the basis of their relationship with change of major as reported in the literature. Change of major frequency was the criterion variable throughout the study, except in Research Hypothesis 6 where it was treated as the independent variable and cumulative credits earned and cumulative grade point averages earned were treated as dependent variables. The independent or predictor variables (pre-enrollment and enrollment) included the following: major status upon initial enrollment (decided, undecided), sureness of program of study, sureness of occupational choice, need for assistance in deciding educational and vocational plans, chance of changing major field, chance of changing career choice, parental levels of education, part-time job, full-time summer job, number of years spent studying vocational-occupational coursework, high

school grade point average, high school rank, number of students in high school graduating class, and ACT composite score.

The sources of data, and the variables included from each were:

A. ACT Assessment and Student Profile Section

1. ACT Composite Score (range 1-35). This number is the numerical average of the four subtests: English, Math, Social Studies, and Natural Science.
2. Certainty of Program of Study: (1) very sure, (2) fairly sure, or (3) not sure.
3. Certainty of Occupational Choice: (1) very sure, (2) fairly sure, or (3) not sure.
4. Need for Help in Educational and Vocational Planning: (1) yes, or (2) no.
5. Number of Students in High School Graduating Class: (1) 25 or fewer, (2) 25-99, (3) 100-199, (4) 200-399, (5) 400-599, (6) 600-899, or (7) 900 or more.
6. Number of Years Studying Vocational Subjects: (1) half year, (2) one year, (3) one and a half years, (4) two years, (5) two and a half years, (6) three years, (7) three and a half years, (8) four years or more, (9) no courses in this subject (in the statistical analysis this response was recoded "0").

7. Held a regular part-time job (e.g., waitress, salesclerk, newspaper carrier, etc.): (1) yes, or (2) no.

8. Held a full-time paying job during the summer: (1) yes, or (2) no.

B. CIRP Student Information Form

1. Academic Rank in High School: (1) lowest 20%, (2) fourth 20%, (3) middle 20%, (4) second 20%, or (5) highest 20%.

2. Average High School Grade: (1) D, (2) C, (3) C+, (4) B-, (5) B, (6) B+, (7) A-, or (8) A or A+.

3. Highest Level of Formal Education Obtained by Parents: (1) grammar school or less, (2) some high school, (3) high school graduate, (4) postsecondary (not college), (5) some college, (6) college degree, (7) some graduate school, or (8) graduate degree.

4. Possible Chance of Changing Major Field: (1) no chance, (2) very little chance, (3) some chance, or (4) very good chance.

5. Possible Chance of Changing Career Choice: (1) no chance, (2) very little chance, (3) some chance, or (4) very good chance.

C. Student Record System

1. Numerical Codes Indicating Academic Majors

2. Cumulative Credit Hours Earned

3. Cumulative Grade Point Averages Earned

Procedure

Information from the Student Record System was extracted from the University's master files through the creation of a "mini data base" on computer disk of those students meeting the selection criteria (i.e., those students who were first-time, full-time freshmen in the fall of 1982).

The Student Record information was consolidated with the ACT Assessment data (stored on magnetic tape) as well as with data from CIRP's Student Information Form. The consolidation process was accomplished through the MERGE procedures of the Statistical Analysis System (SAS) which, by matching observations by social security numbers, created a new data base whose observations consisted of the variables from the three original data bases.

Treatment of the Data

The hypotheses were tested by correlations, t-tests, analysis of variance, and regression procedures.

The following chapter, Chapter IV, will present the analysis of the data.

CHAPTER IV

ANALYSIS OF THE DATA

The purpose of this study was to identify major academic and sociological correlates which may help to determine specific student populations having greater tendencies to experience changes in academic major fields. The analysis of the data pertaining to this purpose is presented in this chapter. The order of presentation for the findings follows that of Chapter I. A statement of the research hypothesis to be tested introduces each of the six sections of the data analysis.

Research Hypothesis 1. There will be no significant difference in the frequency of major changes between those students who initially declare "undecided" and those students who initially choose an academic major.

To test this hypothesis, a t-test for independent samples was performed. It compared the change of major frequency between two groups--those who indicated they were undecided about an academic major upon initial enrollment and those who were decided. Results of the t-test comparing change of major frequency of the two groups are presented in Table 1.

TABLE 1

CHANGE OF MAJOR FREQUENCY OF UNDECIDED AND DECIDED STUDENTS

Group	N	Mean	SD	t
Undecided	169	.598	.789	8.667[a]
Declared	428	1.507	1.270	

[a] $p < .0001$

For the group of students (n = 169) who did not declare an academic major upon initial enrollment, the average number of academic major changes was .598. For those (n = 428) who initially declared an academic major, the average number of changes was 1.507.

The difference in means between the two groups was significant. Students who were initially undecided changed academic majors significantly fewer times than those who initially declared an academic major. Thus, Research Hypothesis 1 is not sustained. There was a significant difference in the frequency of major changes between those students who initially declared "undecided" and those students who initially chose an academic major. However, it is important to reiterate that students who were initially undecided upon enrollment were allowed one major change that was not included in their change of major frequency scores--the change from "undecided" to the first academic major

declared. On the other hand, all major changes made by decided students were included in their change of major frequency scores.

To further compare change of major frequency between those students who declared a major and those students who were initially undecided, frequency and mean counts were conducted.

As previously stated, for those students who were undecided (n = 169), the average number of changes made between academic majors was .598. Specifically, 56.8% (n = 96) of the students did not make any changes between academic majors, 29% (n = 49) of the students made one change, 11.8% (n = 20) of the students made two changes, and 2.4% (n = 4) of the students made three changes. Again, as previously stated, the average number of changes made by those students (n = 428) who declared an academic major was 1.507. One hundred twenty, or 28%, never changed their majors, 24.3% (n = 104) changed once, 24.5% (n = 105) changed twice, 16.1% (n = 69) changed three times, 6.1% (n = 26) changed four times, and 0.9% (n = 4) changed their majors five times. These findings are presented in Table 2.

Table 3 presents the number of major changes made by the two groups of students per semester period. It can be seen that for those students who did not declare a major, the greatest number of major changes (n = 26) were detected at the beginning of the 1984 spring semester. For those students who declared a major, most changes (n = 220) were detected at the beginning of the 1983 fall semester. For

TABLE 2

NUMBER OF ACADEMIC MAJOR CHANGES MADE BY UNDECIDED AND DECIDED STUDENTS

Number of Changes	Undecided (n = 169)	Decided (n = 428)
0	96	120
1	49	104
2	20	105
3	4	69
4	0	26
5	0	4
Total	101	645

the students who did not declare a major, the apparent delay in changes in academic majors may be an artifact of the definition of change. The initial change for "undecided" students was not counted as a change--and the longer in delay in declaring a major, the longer the time might be before they change their first declared majors.

Research Hypotheses 2 through 4 address the correlation of pre-enrollment variables and change of major frequency. Each hypothesis will be addressed separately, but results will be cumulatively presented in Table 4.

TABLE 3

NUMBER OF CHANGES MADE BY UNDECIDED AND DECIDED STUDENTS PER SEMESTER TIME PERIODS

Semester	Number of Changes by Undecided Students (n = 169)	Number of Changes by Decided Students (n = 428)
Spring, 1983	0	123
Fall, 1983	18	220
Spring, 1984	26	86
Fall, 1984	18	82
Spring, 1985	15	43
Fall, 1985	17	57
Spring, 1986	7	34
Total	101	645

Research Hypothesis 2. There will be a significant relationship between students' indications of their sureness of major and occupational choices and change of major frequency.

The non-significant correlation between change of major frequency and the variables, sureness of program of study and sureness of occupational choice both resulted in r^2 values of .001. It is apparent that these variables do not account for a significant amount of variance on change of major frequency. Research Hypothesis 2 is not sustained.

TABLE 4

CORRELATION OF SELECTED VARIABLES
WITH CHANGE OF MAJOR FREQUENCY

Variable	n	r	r^2	p
Sureness of program of study	591	-.033	.001	.418
Sureness of occupational choice	591	.024	.001	.566
Need for help with educational and vocational plans	595	-.020	.0004	.632
Chance of changing major field	397	-.035	.001	.488
Chance of changing career choice	397	-.054	.003	.281

There was no significant relationship in the change of major frequency between students indicating greater sureness of major or occupational choices and students indicating less sureness of such choices.

Research Hypothesis 3. There will be a significant relationship between students' indications of their need for assistance in deciding educational and vocational plans and change of major frequency.

As depicted in Table 4, there is a non-significant correlation between change of major frequency and the variable, need for help with educational and vocational plans. The r^2 value is .0004, indicating the

variable does not account for any significant amount of variance on change of major frequency. Research Hypothesis 3 is not sustained. There was no significant relationship in change of major frequency between those students indicating greater need for vocational assistance and those students indicating less need for such assistance.

Research Hypothesis 4. There will be a significant relationship between students' predictions of change in major fields or career choices and actual changes in major field.

As depicted in Table 4, there were non-significant correlations between change of major frequency and the variables, chance of changing major fields and chance of changing career choices. The r^2 values of .001 and .003 indicated that the variables do not account for a significant amount of variance on change of major frequency. Research Hypothesis 4 is not sustained. There was no significant relationship in change of major frequency between those students indicating greater chance of changing major fields or career choices and students indicating less chance of changing such choices.

Research Hypothesis 5. There will be significant relationships between change of major frequency and the following selected academic, demographic, and sociological variables: parental levels of education, work experience, number of years spent studying vocational-occupational coursework, high school grade point average, high school rank, number of students in high school graduating class, and the ACT composite

score. (Some researchers refer to at least some of these variables as educational variables.)

To test the hypothesis, a multiple regression analysis was performed. The R^2 value for the regression model was .035 and the F value was 1.494. These values indicate that the variables do not account for a significant amount of variance on change of major frequency. Consequently, there is little predictability of change of major frequency from this set of variables.

Table 5 presents the beta weights, t values, and simple correlations of the selected variables. Two variables, average grade in high school and number of students in the high school graduating class were statistically significant. Their beta weights were -.141 and -.170, respectively.

Stepwise forward regression procedures were applied to the variables. The significance level used for entry into the model was .05. Two variables, average grade in high school and number of students in the high school graduating class, entered the model. The first variable to enter the model, number of students in high school graduating class, resulted in a partial R^2 value of .018, a model R^2 value of .018, and an F value of 6.92 which was significant at the .01 level. The only other variable to enter the model, average grade in high school, resulted in a partial R^2 value of .011, a model R^2 value of .029, and an F value of 4.19 which was significant at the .01 level. These values indicate

TABLE 5

SUMMARY TABLE FOR SELECTED VARIABLES WITH CHANGE OF MAJOR FREQUENCY (N = 380)

Variable	Beta Weights	t Values for Beta	r
Held a part-time job	-.039	.709	.0005
Held a full-time job during summer	.001	.022	-.019
Average grade in high school	-.141	2.110[a]	-.092
Academic rank in high school	.024	.386	-.016
Number of students in high school graduating class	-.170	2.970[b]	-.134
Number of years studied vocational subjects	-.035	.657	-.002
Father's highest level of education	-.009	.136	-.012
Mother's highest level of education	.038	.627	.023
ACT Comprehensive score	.043	.683	-.029

[a] $p < .05$

[b] $p < .005$

significant relationships between the two variables and change of major frequency, although it is apparent the variables account for little variance on change of major frequency.

To further examine the relationship between the two variables and change of major frequency, a separate regression analysis was performed using only the two variables as predictors. The F value for the regression model was 6.252 which was significant at the .005 level. The R^2 value was .031. These results indicate the pre-enrollment variables, number of students in high school graduating class and average grade in high school, account for approximately three percent of the variance on change of major frequency.

Tables 6 and 7 present descriptive statistics of the two variables, number of students in high school graduating class and average grade in high school.

By examining Tables 6 and 7, it is apparent that there are considerable discrepancies in the number of students per cell by class size and grade point average levels. For some levels, very limited numbers of students were represented. Thus, outcomes for small cell frequency groups should be interpreted with caution. It does appear that students with higher grade point averages do have slightly fewer changes and that students from high school graduating class sizes of 400-599 students have fewer changes. However, neither variable yields strong generalizations. Therefore, Research Hypothesis 5 is weakly sustained

TABLE 6

FREQUENCIES OF STUDENTS IN CLASS SIZES AND MEAN NUMBER OF CHANGES BY CLASS SIZES

Class Size	Number of Students	Mean Number of Changes
Less than 25	69	1.420
25- 99	201	1.403
100-199	65	1.046
200-399	182	1.209
400-599	54	.889
600-899	14	1.214
900 or more	9	1.333

for the two variables, high school grade point average and number of students in the high school graduating class. For the most part, however, Research Hypothesis 5 seems tenable as a generalization under the weaker form: there are no striking relationships between change of major frequency and parental levels of education, work experience, number of years spent studying vocational-occupational coursework, high school grade point average, high school rank, number of students in high school graduating class, and the ACT composite score.

TABLE 7

MEAN NUMBER OF CHANGES MADE BY STUDENTS
AT GRADE POINT AVERAGE LEVELS

High School Grade Point Average	Number of Students	Mean Number of Changes
A or A+	125	1.144
A-	93	1.323
B+	86	1.221
B	62	1.516
B-	17	1.471
C+	9	1.444
C	2	2.500

Research Hypothesis 6. Students who change majors more frequently will have lower grade point averages and earn less credit hours than those changing majors less frequently.

First a Pearson correlation was conducted to examine the relationship between change of major frequency and grade point averages and credit hours earned. The r values were -.089 and -.186, respectively, and the significance values were .03 and .0001, respectively. These values indicate significant relationships between the independent variable, change of major frequency, and the dependent variables, cumulative credits and grade point averages earned. As a result of the

significant findings, Research Hypothesis 6 is sustained. However, it is apparent that change of major frequency accounts for minimal variance in cumulative credit hours or grade point averages earned.

The data was treated in another manner. The population was subdivided according to total number of changes made. Six groups were formed including those students changing majors 0, 1, 2, 3, 4, and 5 times. Analysis of variance procedures were used. Means for cumulative credit hours earned and cumulative grade point averages earned are presented in Table 8.

TABLE 8

MEANS FOR CUMULATIVE CREDIT HOURS AND CUMULATIVE GRADE POINT AVERAGES EARNED BY CHANGE OF MAJOR FREQUENCY LEVELS

Change of Major Frequency Levels	N	Cumulative Credit Hours	N	Grade Point Averages
0	216	117.852	216	3.159
1	150	116.860	150	2.947
2	122	118.386	122	3.040
3	71	118.394	71	2.880
4	26	111.577	26	2.838
5	4	112.000	4	2.640

The F and R^2 values for the relationship between change of major frequency and the variable, cumulative credit hours were 1.43 and .012, respectively. These values indicated no significant relationship between cumulative credit hours earned and change of major frequency. The F and R^2 values for the relationship between change of major frequency and the variable, cumulative grade point averages, was 6.17 and .05, respectively. These values indicated that cumulative grade point average is significantly related to change of major frequency but accounts for only five percent of the variance on change of major frequency.

It is important to reiterate that cumulative credit hours and grade point averages earned were analyzed according to levels of change of major frequency. To determine whether a simple linear trend existed, or if a high ordered polynomial would give a better explanation of the data, polynomial regression analyses were conducted. Results from these analyses did not show any departure from linearity when relating frequency of major change with cumulative credits and cumulative grade point averages.

Given the analysis of the data when the population was divided into six levels (according to the number of academic major changes made), Research Hypothesis 6 is sustained for the relationship between the cumulative grade point average and change of major frequency. However, it is not sustained for the relationship between cumulative

credit hours and change of major frequency. Thus, it is evident that students who change majors more frequently have lower grade point averages than those changing less frequently; and students who change majors more frequently do not significantly differ in their credit hours earned from those who change less frequently.

To briefly summarize the analyses of the data, students who were initially undecided made fewer changes of academic majors than those students who initially declared a major. Students' indications of level of certainty of major and occupational choices were not related to change of major frequency; nor were students' indications of need for vocational assistance or likelihood to change major or occupational choices. Students who had higher high school grade point averages and came from larger high school graduating classes changed significantly fewer times than those students with lower grade point averages and those from smaller graduating classes. However, the dependent variables of size of high school graduating class and grade point averages offered little explained variance on change of major frequency. Previous work experience, academic rank in high school, number of years vocational subjects were studied, parental levels of education, and ACT comprehensive scores were not related to frequency of change of major. Regarding the relationship between cumulative credit hours and grade point averages earned, when the data was analyzed with a simple correlation, it was apparent that as change of major increased,

cumulative grade point averages and credit hours earned decreased. However, cumulative grade point averages and credit hours earned explained little variance in change of major frequency. When the data was analyzed in another manner, by examining the relationship between levels of change of major frequency (according to the number of changes made) and cumulative credits and grade point averages earned, the relationship between change of major frequency and cumulative credit hours earned was no longer significant. A significant relationship between grade point averages earned and change of major frequency was maintained, however.

Ancillary Findings

This section reports additional findings relevant to the present study. Of the 597 students who maintained their enrollment through or graduated prior to the 1986 spring semester, 319 were women and 278 were men. Of the total population, 36.2% never changed between academic majors, whereas 63.8% changed at least once. Specifically, 153, or 25.6%, of the population changed majors once; 20.9% (n = 125) changed twice; 12.2% (n = 73) changed three times; 4.4% (n = 26) changed four times; and 0.7% (n = 4) changed five times. These findings are included in Table 9. (It should be reiterated that the first change to an academic major by initially undecided students was not counted as a change of major.)

TABLE 9

FREQUENCY OF MAJOR CHANGES BY STUDENTS
FROM 1982 FALL SEMESTER TO
1986 SPRING SEMESTER

Number of Changes	Number of Students	Percentage
0	216	36.2
1	153	25.6
2	125	20.9
3	73	12.2
4	26	4.4
5	4	0.7

Change of major was measured at the beginning of each semester, beginning with the 1983 spring semester. As Table 10 indicates, most major changes occurred at the beginning of the 1983 fall semester.

The average number of changes made by the total population (N = 597) was 1.25. A t-test was conducted to determine if there was a significant difference in frequency of major change between males and females. Results are presented in Table 11.

As depicted, there was no significant difference in change of major frequency scores between males and females.

TABLE 10

FREQUENCY OF MAJOR CHANGES AND PERCENTAGE OF STUDENT POPULATION MAKING CHANGES PER SEMESTER

Semester	Number of Changes	Percentage
Spring, 1983	123	20.6
Fall, 1983	238	39.9
Spring, 1984	112	18.8
Fall, 1984	100	16.8
Spring, 1985	58	9.7
Fall, 1985	74	12.4
Spring, 1986	41	6.9

TABLE 11

CHANGE OF MAJOR FREQUENCY OF MALES AND FEMALES

Sex	n	Mean	SD	t	p
Males	278	1.216	1.239	.628	.530
Females	319	1.279	1.213		

Finally, the ancillary findings will briefly address the hypotheses in relation to a definition of major change different from the one used within the study. The study specifically focused on changes between academic majors. It did not regard the first change to an academic major, by initially undecided students (n = 169), as a change of major. Therefore, 167 changes (2 students remained undecided throughout the period of study) were not calculated within the statistical analyses of the hypotheses.

Assuming Foote (1980) is accurate when he proposed that freshmen students with determined majors are no more decided than those students admitting their indecision, it may be beneficial to treat all changes of majors equally. In doing so the relationships between the variables and change of major frequency are significantly affected as described in the following paragraphs.

First, there would no longer be a significant difference in change of major frequency between students who were initially undecided and those who indicated their decidedness by declaring an academic major. The mean number of changes for those who were undecided was 1.586 and for those decided, 1.507.

Several other variables not previously found to be significantly related to change of major frequency became significant when utilizing the different definition of major change. These variables included: sureness of program of study and sureness of occupational choice,

self-professed need for assistance with educational and vocational plans, and self-professed likelihood of changing major fields. These variables, however, explained little variance on change of major frequency.

The following chapter, Chapter V, presents the summary, limitations, and recommendations of the study.

CHAPTER V

SUMMARY, LIMITATIONS, AND RECOMMENDATIONS

Summary

The major purpose of this study was to examine the relationships between pre-enrollment and enrollment academic/sociological variables and change of major frequency. The research population consisted of 597 students who enrolled as first-time, full-time freshmen at the University of North Dakota in the fall semester of 1982. These students graduated prior to or maintained their enrollment through the 1986 spring semester and had an ACT composite score on record.

The study was ex post facto in nature. Students' responses to previously completed items on the ACT Student Profile Section and on CIRP's Student Information Forms were obtained through the assistance of the Office of Institutional Research at the University of North Dakota. Students' major choices and academic performances (e.g., credit hours earned, grade point averages earned) were provided through the Registrar's Office at the University of North Dakota. Relationships between change of major frequency and the following variables were examined: major status upon enrollment (decided, undecided), sureness

of major and occupational choices, need for assistance in deciding educational and vocational plans, prediction of change of major or career choices, parental levels of education, work experience, number of years spent studying vocational-occupational coursework, high school grade point average, number of students in high school graduating class, ACT composite score, college cumulative grade point average, and cumulative credit hours earned in college.

The data obtained was analyzed for its relationship with change of major frequency. Statistical procedures included t-tests, simple correlations, analysis of variance, and multiple regression procedures.

The findings of the present study are addressed in the same order in which the research hypotheses were presented. Each research hypothesis will be restated, and each will be followed by discussion of major findings by the current study and their relationship with previous findings in the literature. These relationships, however, must be interpreted with caution because the terminology and methodological procedures of the studies were not always clearly defined or similar in nature. Thus, even though various studies may have achieved similar findings, the perceived similarities may be misleading as numerous other factors (e.g., methodological procedures, definitions of change of major) influence their interpretation.

1. Research Hypothesis 1. There is no significant difference in the frequency of major change between those students who initially

declare "undecided" and those students who initially choose an academic major.

Hypothesis 1 was not sustained for the definition of major change used in this study. There was a significant difference in the frequency of major changes between those students who initially declared "undecided" and those students who initially chose an academic major. Students who were undecided upon initial enrollment ($n = 169$) changed academic majors significantly fewer times ($\bar{x} = .598$) than those ($n = 428$) who declared an academic major ($\bar{x} = 1.507$).

The results of the present study are in the same direction as those reported by Krupka and Vener (1978). They also found that decided students changed majors more frequently than undecided students. On the other hand, Condron (1979) and Theophilides et al. (1984) did not find any significant difference between frequencies of major change made by decided and undecided students.

Condron's (1979) study defined major change similar to the present study. For undecided students, change of major frequency was determined after the first formal registration of a major. However, students' self-reporting of major change frequency was utilized in Condron's study. Consequently, all students may not have used the same criteria when reporting changes of majors.

In addressing the findings related to Research Hypothesis 1, it should again be emphasized that the first change to an academic major

by students who were undecided upon initial enrollment was not counted in their change of major frequency. This group of students was allowed one major change that was not allowed those students who initially declared a major. It should also be stated that the present study treated the two groups of students, those decided and those undecided, as homogeneous in nature. In reality, of course, they are hetereogeneous in nature. Not all "undecided" students are equally undecided; nor are all "decided" students equally decided. Thus it is important to consider career decision on a continuum basis. This continuum may range from chronic indecision related to psychological dysfunction (Fuqua & Hartman, 1983) to effective career decision-making based on vocational maturity (Phillips & Strohmer, 1982). Furthermore, some students may indicate they are undecided about a major when in actuality they may be more decided than some students who have declared a specific major. As Foote (1980) suggested, "any real differences between students with determined majors and undetermined majors are difficult to find during the freshmen year but may show up more clearly as the students progress through their academic careers" (p. 29).

2. Research Hypothesis 2. There will be a significant relationship between students' indications of their sureness of major and occupational choices and number of major changes made.

Research Hypothesis 2 was not sustained. There was no significant relationship between students' indications of their certainty

of major and occupational choices and number of changes made. Contradictory findings were reported in the literature. Titley and Titley (1980) concluded that freshmen who were unsure of their initial choices of majors were more likely to change majors than those who indicated greater certainty. Within their analysis they found that of the students who continued their enrollment for two years, only one-third of those who indicated low-certainty of major choice maintained their original major. A significantly larger percentage, 72%, who indicated high-certainty, maintained their original major. Gamble (1962) and Gartman (1971/1972) reported similar relationships between indication of certainty and frequency of major changes. Both indicated that in their studies, the more certain the students were about their choices of majors, the fewer changes made.

3. Research Hypothesis 3. There will be a significant relationship between students' indications of their need for assistance in deciding educational and vocational plans and change of major frequency.

Research Hypothesis 3 was not sustained. There was no significant relationship between students' indications of need for assistance in deciding educational and vocational plans and change of major frequency. Although no studies were found in the literature that specifically addressed the relationship between students' self-perceived need for vocational assistance and change of major frequency, the results of the present study may imply that students do not have accurate

perceptions of their own career development. The literature has offered explanations as to why this proposition may be true. Many researchers have contended that students may not have sufficient information or have the wrong information to make stable career decisions (Barak et al., 1975; Franklin, 1970/1971; Pierson, 1962; Prediger et al., 1977; Thistlewaite, 1960). It has been suggested that students most frequently seek out career information sources (e.g., family and friends) that are least effective in the career decision process (Greenhaus et al., 1983). The need to provide better career information was frequently addressed in the literature. Results of an extensive study conducted by Prediger et al. (1977) amplified the need for career development intervention within the public schools. They found that only 20% of the nation's 11th grade students were participating in what was described as a very low level of involvement in career planning activities.

Prediger et al. (1977) also indicated that much of the career information the high school students were receiving was misinformation. Students may also receive misinformation within the college environment. Franklin (1970/1971) indicated that educators do not always portray what they have to offer in an honest and forthright manner. The contention that institutions, particularly academic departments, are self-centered in their efforts to retain students (to maintain their own vitality) as opposed to helping students identify their own needs has been frequently referred to in the literature (Duckworth, 1979; Grites, 1981; Medalia, 1968).

Research Hypothesis 4. There will be a significant relationship between students' predictions of changes in major field and career choices and actual changes in major field.

Research Hypothesis 4 was not sustained. There was no significant relationship between students' predictions of changes in major fields or career choices and changes of major frequency. Theophilides et al. (1984) also addressed students' self-perceived predictions of changing major or career choices and also utilized the same method of data source (the Student Information Form of CIRP) as the present study. In contrast to the present study, Theophilides et al. found a significant relationship between change of major frequency and the two variables, chance of changing major and chance of changing career.

Perhaps the results of the present study can be partially explained by the idea that students need to experience college and begin to know their strengths and weaknesses, before they can make confident major or career choices (Berger, 1967).

Research Hypothesis 5. There are significant relationships between change of major and the following selected academic, demographic, sociological variables: parental levels of education, work experience and number of years studying vocational-occupational coursework, high school grade point average, high school rank, number of students in high school graduating class, and the ACT composite score.

Research Hypothesis 5 was weakly sustained for only two variables, high school grade point average and number of students in the high school graduating class. The following variables were not found to be significant in the regression model: parental levels of education, work experience, number of years spent studying vocational-occupational coursework, high school rank, and ACT composite score.

Considering the relationship between pre-enrollment academic variables (e.g., high school grade point average, rank in high school graduating class, ACT composite score) and change of major frequency, the literature review presented contradictory findings.

Astin and Panos (1969) and Franklin (1970/1971) addressed the relationship between high school grade point average and change of major frequency. Astin and Panos' study was sponsored by the American Council on Education (ACE) and served as a prototype for the Cooperative Institutional Research Program, the program responsible for the Student Information Form utilized within the present study. Their findings were similar to the findings of the present study in that "students with superior academic records were more likely than were average students to make stable choices" (p. 105). Franklin (1970/1971), however, found no significant relationship between high school grade point average and frequency of major change.

High school rank was not found to be significantly related to change of major frequency within this study. This result is similar to

previously reported research (Gamble, 1962; Matteson, 1953; Theophilides et al., 1984), but in contradiction to one other study cited in the literature (Eike, 1982).

The final pre-enrollment academic variable, the ACT comprehensive score, was not found to be significantly related to change of major frequency. Eike (1982) reported similar findings when addressing the relationship between entry test scores (i.e., SAT, SCAT, and ACT) and probability of switching majors. Other studies (Franklin, 1970/1971; Theophilides et al., 1984) addressed the relationship between entry test scores and change of major frequency. They also found no relationship between these scores and change of major frequency.

Students with previous work experience did not change majors fewer times than those with less work experience. Gamble (1962) reported similar results. Also not significantly related to change of major activity were the levels of education completed by the students' parents. It was anticipated that those students with more educated parents would have had a better understanding or basis from which to have made more effective major or career choices than those students with less educated parents--because they would have been exposed to more diversified sources of career information. However, as indicated by the non-significant findings, this expectation was not borne out by this study. Gamble (1962), Astin and Panos (1969), Scott et al. (1974), and

Eike (1982) previously reported similar non-significant findings. Gamble, however, did indicate that students whose mothers had one or two years of post-high school education made more changes than students whose mothers had more than 14 years, or fewer than 12 years of education. Addressing the father's level of education, Franklin (1970/1971) also found no significant correlation between changes of majors and educational levels.

The number of students in the high school graduating class was a variable found to be significantly related to change of major frequency. Only one study (Gamble, 1962) was found in the literature that addressed the relationship between high school graduating class size and change of major frequency. The Gamble study did not find these variables to be significantly correlated. Although there was a lack of literature directly related to the variables studied, the significant relationship found in the present study may be explained by related literature. The influence of students' demographic backgrounds on their progression in college has been reviewed in the literature. In relation to the present study, a postulate expressed by Feldman and Newcomb (1969) suggested that students from small communities (of which smaller high schools and consequently smaller classes are a part) may experience more discontinuity within college than those students from other backgrounds. As Feldman and Newcomb stated:

> It would be expected that the intellectual, social, and cultural environment or rural areas or small towns, of small high schools, and of working class and lower-middle class homes would be more discontinuous with the college environment than that of large cities, or large high schools, and of middle-middle or upper-middle class homes. Thus . . . the college would have greater potential impacts on the former groups of students than on the latter. (pp. 281-282)

The discontinuity that may be experienced by students from smaller high schools may manifest itself in greater frequency of major changes as compared with major changes made by students from larger classes. It is this researcher's belief that students from smaller communities and, consequently, smaller high school classes, have not had the exposure to as great a variety of careers as students from larger communities. It is not until they have become aware of the numerous career opportunities available, that they may even begin to question their major and career choice decisions.

Research Hypothesis 6. Students who change majors more frequently will have lower grade point averages and earn less credit hours than those changing majors less frequently.

Research Hypothesis 6 was sustained for both variables, cumulative grade point average and cumulative credits, when a correlation was found between these variables and the total number of

changes. It was found that students who more frequently changed majors had lower grade point averages and earned less credit hours than those students changing less frequently. The variables, however, explained little variance on change of major frequency.

When the population was subdivided into groups, according to the total number of changes made (lowest number of changes made = 0, highest = 5), Research Hypothesis 6 was sustained for the variable cumulative grade point average, but not sustained for cumulative credit hours. That is, as change of major frequency increased, grade point averages significantly decreased for the groups. No significant relationship was found between change of major frequency and cumulative credit hours earned by the groups.

The results indicating that as change of major frequency increased, cumulative grade point averages decreased, are similar to those reported in several previous studies (Elliot, 1984; Holland & Nichols, 1964; Marks, 1970; Theophilides et al., 1984; Warren, 1961). Contradictory findings indicating no significant relationships were reported in two studies (Cook, 1965; Titley et al., 1976).

The review of the literature did not present any studies addressing the relationship between change of major frequency and cumulative credit hours earned. As stated earlier, the results of the present study offered contradictory findings depending upon how the variable, change of major frequency, was treated. When a simple correlation was computed for the

total population (N = 597) between cumulative credit hours and change of major frequency, a significant relationship was achieved. However, when the population was subdivided into groups according to the number of changes made, the relationship between the two variables was no longer significant. The relationship between change of major frequency and cumulative credit hours earned needs to be further studied.

The additional findings reported in Chapter IV were similar to other findings reported in the literature. Of the total population (N = 597) studied, 63.8% changed majors at least once. This percentage is typical of the percentages reported in the literature (Feldman & Newcomb, 1969; Snodgrass, 1984; Theophilides et al., 1984). However, this percentage reflects the definition of change of major used within this study which may or may not be comparable to the definitions used in previous studies.

The large percentages of students who change majors have been attributed to a variety of factors including societal pressure (Adamek & Goudy, 1966; Brown & Strange, 1981; Gamble, 1962; Gartman, 1971/1972) and premature choices (Berger, 1967; Titley & Titley, 1980).

Students place pressure on themselves to choose majors early because uncertainty may indicate an inadequate self-identity (Brown & Strange, 1981). One study (Aberman, 1973) reported that of the student population sampled, 68% felt the academic major should be chosen previous to or during their first semester of their sophomore year. Yet, interestingly, it is around that time period when most changes of majors

occur (Elliot, 1984; Franklin, 1970/1971; Pierson, 1962; Titley et al., 1976). Results of the present study are in accord with those reported in the literature. By the beginning of the 1984 spring semester, or by the beginning of what would typically be the second semester of the students' sophomore year, 78.3% of the total number of changes to be made had already occurred. These findings may support the premise that the developmental needs of incoming students, in relation to choices of majors and careers, need to be addressed (Berger, 1967; Marks, 1970; Titley & Titley, 1980).

Finally, the present study found little substantiated difference in the average number of changes made when considering gender. In contrast, Eike (1982) and Matteson (1953) found females to change majors more frequently; whereas, Carmody et al. (1972) and Titley et al. (1976) found females to be more consistent with major choices than males.

In summary, the findings of this study were both in the same direction and contradictory with the results of several previous studies cited in the literature review. Again, however, caution is advised when comparison of results is made because the perceived similarities or differences are limited to the equality of various factors (e.g., methodological procedures, definitions used, various college requirements) between the studies. This study found that students who declared a major upon initial enrollment made significantly more changes

of academic majors than students who indicated indecision. Again it should be noted, however, that the definition of change of major used within this study did not include the first change from "undecided" to an academic major. If the definition were to include these changes there would no longer be a significant relationship. These findings indicate that incoming freshmen who declare a major may not be any more certain of their choices than those indicating indecision.

The variables certainty of major and occupational choice, need for assistance in deciding educational and vocational plans, and chance of changing major and career did not have significant relationships with change of major frequency. Students who were more certain of major and career choices, who indicated less need for vocational assistance, and who indicated a lesser chance of changing majors or careers did not make significantly fewer major changes than those indicating less certainty of major and career choice, greater need for vocational assistance, and greater chance of changing. These findings were not anticipated.

Students who exhibited higher academic performances in high school, and who came from larger high school graduating classes, made fewer major changes than those with lower academic performances and from smaller high school classes.

In general, the results of this study indicate that many incoming students are not prepared to make stable major choices, and have

inaccurate perceptions of, or are unwilling to admit, the void in their own readiness to confidently choose an academic major. This is evidenced by the high change of major activity exhibited by college students. Furthermore, researchers have noted that as students progress in college, many do not have an adequate awareness of their occupational goals (Krupka & Vener, 1978) or become even less specific about such goals as graduation approaches (Titley et al., 1976). Whether these behaviors are to be considered positive or negative is an individual matter; however, it definitely amplifies the suggestion that college students' career development processes need to be further examined and effectively addressed.

Limitations

The following limitation was evident in this study:

1. Future changes of majors may occur and not be represented in this study. Change of major activity was followed through eight consecutive academic semesters, from the 1982 fall semester through the 1986 spring semester. At the conclusion of this study, records from the Registrar's office were not available to indicate how many of the 597 students in the population had completed their degree. However, it is likely that all students had not completed their academic degree by the 1986 spring semester. Therefore, future changes made by students within the population cannot be included.

Recommendations

The following are both research and program recommendations. The proposed research recommendations are based on questions raised but not adequately addressed by the present study. Some of the program recommendations are based on the results of the present study, whereas others are based on this author's perceptions of areas of need within programs serving students.

Research Recommendations

1. A closer examination of what prompts changes of majors is warranted. Understanding what information resources students utilize when changing majors can result in better planning of career development intervention strategies. Further addressing the relationship of academic performance (in college), as measured by cumulative grade point averages and credit hours earned, as well as by course withdrawal activity, also may be helpful.

2. The examination of changes in, or clarification of, students' interests in relation to changes of majors should be investigated. Even though change of major activity was determined to be a prevalent behavior among college students, Astin and Panos (1969) still found that the best predictor of a student's final major was that of initial major choice. Therefore, one could look at whether most major changes occur

within related academic discipline areas or between unrelated areas of study.

3. Addressing the relationship between major choice and occupational choice would be an area worthy of investigation. How do students perceive the utility of their majors in the occupational world? Do they view their majors as being synonymous with their careers? How are students affected by recent reports that many jobs of today will be obsolete tomorrow? Are students foregoing individual interests and choosing less personally desirable majors because such majors represent greater future job security?

4. For retention efforts, it may be valuable to examine change of major activity in relation to students' persistence or nonpersistence in school. Do students who withdraw have greater tendencies to change majors?

In relation to the preceding, Goodson (1978) contended that "educational choice and occupational choice are similar, but should be handled separately when working with students" (p. 150). He further advanced that "[students] who choose their occupation first are more future-time oriented and value security more than those who choose or plan to choose their major first" (p. 152). Presenting somewhat paradoxical findings, Titley et al. (1976) found that within every class level (e.g., freshman, sophomore), students who changed majors were able to be more specific about career goals with the new major chosen

than with the previous major. However, the percentage of students indicating a higher level of specificity decreased with each consecutive class level. That is to say, the closer students approached graduation, the less clear they were about the specific kind of work they would seek.

Focusing on the preceding issues, it would be interesting to determine if a difference exists in the quality and quantity of information provided students on major-related information, as opposed to career-related information. The various channels through which the information is provided should be assessed as well. Perhaps it would be found that too much focus is directed toward choices of major, and too little attention is given to career choices.

5. Determining if a significant difference exists in academic performance (cumulative grade point average and credit hours earned) prior to and after a change in major may provide worthwhile information. This could give some indication as to the relationship academic performance has with change of major activity.

6. Examining student transfer patterns between majors may be beneficial. Do certain major fields have a tendency to gain or lose students? What differentiates students who persist in certain majors from those who do not?

Program Recommendations

1. This author suggests that personnel working with students (advisors, instructors, counselors, professors, resident assistants, etc.) should reassure students that major or career choices do not need to be made immediately or shortly after college entrance, and being undecided about a major or career choice is understandable, acceptable, and not atypical. The same personnel should be aware, however, that career indecision, in its extreme form, may be a product of underlying psychological pathology and referrals to counseling services may be highly appropriate.

2. Colleges and secondary schools should combine their efforts in providing students with adequate opportunities to participate in effective career exploration activities. This connection between high schools and colleges is particularly critical for students from smaller communities. Generally, the students experience "one shot" career days where they briefly talk with representatives from several institutions and are provided with quantities of neatly packaged admission forms and catalogs. In short, the various institutions are preoccupied with marketing themselves and are less concerned with aiding students in the career development process.

3. The current study found that students from smaller high schools and those exhibiting lower high school grade point averages had a greater tendency to change majors. Upon admission, these students could be

targeted for special assistance with career development. Information that emphasizes career development opportunities and resources should be made readily available to them--even before their first day of classes. Furthermore, resident assistants, who generally have the most consistent informal contact with new students, should discuss career exploration opportunities. Perhaps personnel from the Career Development Center or from the Counseling Center could give presentations to students within the residence halls. Emphasis is upon helping students understand the various resources available to them at the greatest point of impact, the residence hall.

4. In general this author suggests that academic advisors should become more attuned to the needs of the students, recognizing dissatisfaction or hesitation by students concerning their major choice. Academic advisors need to be encouraged to make referrals to the Career Development Center or the Counseling Center in such cases.

5. As expected, students seem to become most concerned about choices of majors just prior to or during pre-registration time. Perhaps "check-points" prior to pre-registration could be established whereby posters, student newspaper articles, and student personnel could address the issues of career development, including career indecision and career exploration. Explanation of and encouragement to use resources available to assist students in their career development should be addressed as well. When students are reminded of the

importance of their own career development, there is increased impetus for them to take positive actions.

SELECTED REFERENCES

Aberman, H. M. (1973). College motivation and clarity of occupational choice. Shippensburg, PA: Shippensburg State College (ERIC Document Reproduction Service No. ED 129 208).

Adamek, R. J., & Goudy, W. J. (1966). Identification, sex, and change in college major. Sociology of Education, 39, 183-199.

Akenson, D. H., & Beecher, R. S. (1967). Speculations on change of college major. College and University, 42, 175-180.

Amatea, E. S. (1984). Contributions from theories. In H. D. Burck & R. C. Reardon (Eds.), Career Development Interventions (pp. 25-52). Springfield, IL: Charles C Thomas.

American College Testing Program. (1981). Using the ACT assessment on campus. Iowa City, IA: Author.

Astin, A. W., & Panos, R. J. (1969). The educational and vocational development of college students. Washington, DC: American Council on Education.

Astin, H. W. (1967). Pattern of career choices over time. Personnel and Guidance Journal, 45, 541-546.

Barak, A., Carney, C. G., & Archibald, R. D. (1975). The relationship between vocational information seeking and educational and vocational decidedness. Journal of Vocational Behavior, 7, 149-159.

Beattie, C. M., II. (1984). Behavioral, curricular and demographic variables affecting university students' change in degree major programs (Doctoral dissertation, The Florida State University, 1984). Dissertation Abstracts International, 45, 1048A.

Berger, E. M. (1967). Vocational choices in college. Personnel and Guidance Journal, 45, 888-894.

Brown, D., & Brooks, L. (1984). Introduction to career development: Origins, evolution, and current approaches. In D. Brown & L. Brooks (Eds.), Career Choice and Development (pp. 1-7). San Francisco: Jossey-Bass.

Brown, G. S., & Strange, C. (1981). The relationship of academic major and career choice status to anxiety among college freshmen. Journal of Vocational Behavior, 19, 328-334.

Burck, H. D. (1984). Facilitating career development: Past events, current scenes, and the future. In H. D. Burck & R. C. Reardon (Eds.), Career Development Interventions (pp. 5-24). Springfield, IL: Charles C Thomas.

Carmody, J. F., Fenske, R. H., & Scott, C. S. (1972). Changes in goals, plans, and background characteristics of college-bound high school students. (Report No. ACT-RR-52). Iowa City, IA: American College Testing Program, Research and Development Division (ERIC Document Reproduction Service No. ED 068 047).

Churchill, W. D., & Iwai, S. I. (1981). College attrition, student use of campus facilities, and a consideration of self-reported personal problems. Research in Higher Education, 14, 353-365.

Cole, J. W., Wilson, K. M., & Tiedman, D. V. (1964). Dispersion analysis and the search for educational goals in college: A study in duplicate. Journal of Educational Psychology, 55, 121-131.

Condron, B. (1979). College major choice and its timing. (Master's thesis). Wilkes-Bakrre, PA: Wilkes College (ERIC Document Reproduction Service No. ED 174 926).

Cook, M. D. (1965). College students change majors. School and Society, 93, 271-273.

Cooperative Institutional Research Program. (1982). The American freshmen: National norms for fall 1982. Los Angeles, CA: Author.

Dole, A. A. (1963). Educational choice is not vocational choice. Vocational Guidance Quarterly, 12, 31-35.

Dressel, P. L., & Simpson, W. A. (1980). Student persistence and benefits: Program selection and degree completion. New York, NY: Exxon Education Foundation (ERIC Document Reproduction Service No. ED 219 996).

Duckworth, W. E. (1979). Reasons for change of major by California state university students. Masters Abstracts, 17, 248. (University Microfilms No. 13-13, 188).

Eike, A. M. (1982). The undergraduate decision to change major: An empirical investigation. Dissertation Abstracts International, 43, 3821A. (University Microfilms No. 83-10,385).

Elliot, Earl S. (1984). Change of major and academic success. National Academic Advising Journal, 4, 39-45.

Elton, C. F., & Rose, H. A. (1966). Within-university transfer: Its relation to personality characteristics. Journal of Applied Psychology, 50, 539-543.

Feldman, K. A., & Newcomb, T. M. (1969). The impact of college on students (Vol. I). San Francisco: Jossey-Bass.

Foote, B. (1980). Determined- and undetermined-major students: How different are they? Journal of College Student Personnel, 21, 29-34.

Franklin, G. D. (1971). A longitudinal analysis of changes in course of study by college students (Doctoral Dissertation, Texas A & M University, 1970). Dissertation Abstracts International, 31, 5124A.

Fuqua, D. R., & Hartman, B. W. (1983). Differential diagnosis and treatment of career indecision. Personnel and Guidance Journal, 62, 27-29.

Gamble, G. W. (1962). Pre-college experiences and curriculum changes by college students. Personnel and Guidance Journal, 40, 561-564.

Gartman, J. C. (1972). An investigation of relationships between selected personality traits and factors associated with change of major in state supported colleges in Arkansas (Doctoral dissertation, Northeast Louisiana University, 1971). Dissertation Abstracts International, 32, 4346A.

Gelso, C. J., & Sims, D. M. (1968). Faculty advising: The problem of assigning students on the basis of intended major. Journal of College Student Personnel, 9, 334-336.

Ginzberg, E. (1971). Toward a theory of occupational choice: A restatement. Journal of Vocational Behavior, 1, 167-176.

Goodson, W. D. (1978). Which do college students choose first--Their major or their occupation? Vocational Guidance Quarterly, 34, 150-155.

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.

Grites, T. J. (1981). Being "undecided" might be the best decision they could make. School Counselor, 29, 41-46.

Hecklinger, F. J. (1972). The undecided student--Is he less satisfied with college? Journal of College Student Personnel, 13, 247-251.

Holland, J. L., & Nichols, R. C. (1964). Explorations of theory of vocational choice: A longitudinal study of change in major field of study. Personnel and Guidance Journal, 43, 235-242.

Kojaku, L. K. (1971). Major field transfer: The self-matching of university undergraduates to student characteristics. Los Angeles, CA: California University (ERIC Document Reproduction Service No. ED 062 933).

Krupka, L. R., & Vener, A. M. (1978). Career education and the university: A faculty perspective. Personnel and Guidance Journal, 57, 112-114.

Lonabocker, L. (1982). Can an institution construct a dropout profile? College and University, 58, 76-84.

Marks, E. (1970). Cognitive and incentive factors involved in within-university transfer. Journal of Educational Psychology, 61, 1-9.

Matteson, R. W. (1951). Changes in curriculum preference made by basic college students. College and University, 26, 257-264.

Matteson, R. W. (1953). Concomitants of changing curriculum preference. College and University, 28, 223-238.

Medalia, N. Z. (1968). Choice of college major by contest mobility. Sociology of Education, 41, 283-390.

Osipow, S. (1983). Theories of career development (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Pantages, T. J., & Creedon, C. F. (1978). Studies of college attrition: 1950-1975. Review of Educational Research, 48, 49-101.

Phillips, S. D., & Strohmer, D. C. (1982). Decision-making style and vocational maturity. Journal of Vocational Behavior, 20, 215-222.

Pierson, R. R. (1962). Changes of majors by university students. Personnel and Guidance Journal, 40, 458-461.

Prediger, D. J., Roth, J. D., & Noeth, R. J. (1977). Career development of youth: A nationwide study. In H. J. Peters & J. C. Hansen (Eds.), Vocational Guidance and Career Development (3rd ed.) (pp. 167-176). New York: Macmillan.

Schmidt, D. K., & Sedlacek, W. E. (1972). Variables related to university student satisfaction. Journal of College Student Personnel, 13, 233-238.

Scott, C. S., Fenske, R. H., & Maxey, E. J. (1974). Vocational choice change patterns of a national sample of community-junior college students. (Report No. ACT-RR-64). Iowa City, IA: American College Testing Program, Research and Development Division (ERIC Document Reproduction Service No. ED 093 432).

Snodgrass, G. (1984). Integrating college and career planning: A counseling paradigm. Journal of College Student Personnel, 25, 149-155.

Theophilides, C., Terenzini, P. T., & Lorang, W. (1984). Freshman and sophomore experiences and changes in major field. The Review of Higher Education, 7, 261-278.

Thistlethwaite, D. L. (1960). College press and changes in study plans of talented students. Journal of Educational Psychology, 51, 222-234.

Tiedman, D. V., & Miller-Tiedman, A. (1984). Career decision making: An individualistic perspective. In D. Brown & L. Brooks (Eds.), Career Choice and Development (pp. 281-310). San Francisco: Jossey-Bass.

Titley, R. W., Titley, B., & Wolff, W. M. (1976). The major changers: Continuity or discontinuity in the career decision process? Journal of Vocational Behavior, 8, 105-111.

Titley, R. W., & Titley, B. S. (1980). Initial choice of college major: Are only the "undecided" undecided? Journal of College Student Personnel, 21, 293-298.

Van Wey, R. L. (1977). Student's lack of career direction a problem. Journal of College Placement, 38, 31-32.

Walsh, W. B., Spokane, A. R., & Mitchell, E. (1976). Consistent occupational preferences and academic adjustment. Research in Higher Education, 4, 123-129.

Warnath, Charles F. (1977). Vocational theories: Direction to nowhere. In H. J. Peters & J. C. Hansen (Eds.), Vocational Guidance and Career Development (3rd ed.) (pp. 17-25). New York: Macmillan.

Warren, J. R. (1961). Self-concept, occupational role expectation, and change in college major. Journal of Counseling Psychology, 8, 164-169.

Watley, D. J., & Werts, C. E. (1969). Career selection: Turnover analysis and the "birds of a feather" theory. Journal of Counseling Psychology, 16, 254-259.

Weitz, H., Clarke, M., & Jones, O. (1955). The relationships between choice of a major field of study and academic preparation and performance. Educational and Psychological Measurement, 15, 28-38.

Werts, C. E., & Watley, D. J. (1968). Determinants of changes in career plans during college. Sociology of Education, 41, 401-405.