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PREDICTING STUDENT ATTRITION

AT AN URBAN COLLEGE

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A Dissertation Presented to The Faculty

of The School of Education of

The College of William and Mary in Virginia

———————————————

In Partial Fulfillment of the Requirements

for the Degree Doctor of Education

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by E. Michael Staman

July 1979
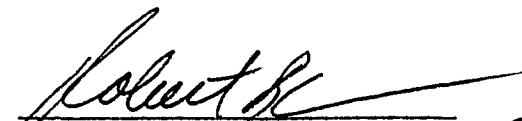
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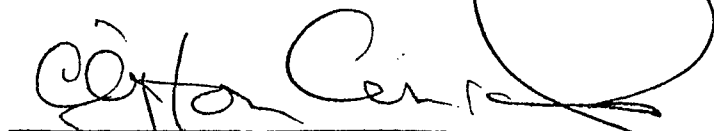
AT AN URBAN COLLEGE

by

E. Michael Staman

Approved July 12, 1979, by

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Chairman of Doctoral Committee

DEDICATION

I wish to gratefully acknowledge the efforts of my graduate advisor, Dr. Donald J. Herrmann, and Dr. Clifton Conrad and Dr. Robert Bloom, members of my dissertation committee. To a very great extent, perhaps even greater than they realize, this document reflects the assistance and guidance of these men.

The project would not have been possible, however, without the continual support and encouragement of my wife, Louise, and my children, Laura, Karen and Jeanette. I dedicate this dissertation to them in recognition of the sacrifices that they have made on my behalf.

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CHAPTER I: INTRODUCTION

The phenomenon of enrolling in college but failing to complete a
degree is called attrition, a condition that most educators consider to
be undesirable. The problem exists in the sense that there are students
who enroll with the intention of earning a degree but who drop out fo
some reason along the way, and the growing body of literature on attri-
tion indicates that concern over the issue is not abating.

In fact, the concern about attrition may be heightening as the 1980s
approach. Cope and Hannah (1975, p. 1) note that approximately 60 per-
cent of entering freshmen do not achieve the baccalaureate in four years
and that 40 to 50 percent never earn a degree (1975, p. 6). In a period
of potentially declining enrollment, a large attrition rate will surely
attract administrators' attention, for, as Astin accurately notes, a ten
percent decline in the number of students on campus does not yield a
corresponding ten percent decline in costs. Astin further notes that
reducing attrition has an immediate and positive effect on enrollment,
and thus resources allocated toward stemming attrition may be more cost
effective than, for example, resources for recruitment (1975, p. 2).
Thus, as higher education looks forward to the next decade and recognizes
the severe resource problems likely to occur as a result of declining
enrollments, the attrition problem becomes increasingly related to the
basic institutional desire for survival.

In short, the reasons for studying the attrition phenomenon relate
to the need to minimize the loss related to investing student and insti-
tutional resources in efforts that do not reach their full potential, to

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the issue of survival in a declining market, and finally, to the nagging suspicion that if educators could better understand the phenomenon, they might be able to minimize attrition and thus provide better service to students.

Statement of the Problem

The problem was to design and implement a model that would predict attrition for an urban, nonresidential college which enrolls a large percentage of non-traditional students. Tinto's theoretical model of attrition formed the conceptual base for the model.

Purpose of the Study

The purpose of the study was to test Tinto's theoretical model of attrition, a model which suggests in part that, while student expectational and motivational attributes are important in predicting attrition, background characteristics are at least equally important (Tinto, 1975, p. 93). Also projected was a test of the implication which appears in virtually every synthesis of the literature that the attrition phenomenon is multi-faceted.

If Tinto's model is correct, then factors affecting attrition may be different for different colleges, and possibly for different groups of students within a given college. Thus the purpose of the study was to determine whether variables such as students' goals, reasons for attending college, academic background, socio-economic background, basic demographic characteristics, expectations about college, source of financial support, participation in college activities, use of college facilities, and college choice criteria, could be successfully

incorporated into a mathematical model capable of predicting attrition at the college being studied.

Rationale for Studying the Problem

Studies and reports which include multiple institutions or which focus on a broad spectrum of high school graduates have contributed to our knowledge about the general characteristics of students and/or student persistence in generic categories of institutions. Examples of such research and reports include: One Hundred Who Left College, a study involving several colleges in New York City (Lurie, Borxt, Barshop and Goldsamt, 1966); Preventing Students from Dropping Out, a longitudinal study with an original sample of over 243,000 students (Astin, 1975); and Revolving College Doors, a study which examines such factors as differences among colleges, among kinds of students, and among phases in the collegiate career (Cope and Hannah, 1975). In addition, a number of excellent summaries of research on attrition exist (Summerskill, 1962; Spady, 1970; Tinto, 1975; Pantages and Creedon, 1978).

These and related studies have contributed to an understanding of the attrition phenonemon. Their results and conclusions are generalizable within limits defined by student demographic characteristics and by institutional type, size, location, and selectivity. Institutions can use these conclusions as beginning points in discussions leading to changes in institutional policy or direction, and finally, such studies are useful in providing a focus for further investigations within a particular institution.

Baumgart and Johnstone point out that studies of single institutions

are also important.

> As the characteristics of individual institutions
> differ according to, for example, the type of student
> body enrolled, the subjects taught, and the types of
> teaching and assessment procedures used, each insti-
> tution must identify and describe unique factors
> relating to discontinuing within its own province.
> (Baumgart and Johnstone, 1977, p. 554).

The characteristics mentioned by Baumgart and Johnstone can be expanded to include most basic student demographic variables, institution size, location and, finally, the basic goals, attitudes, and financial support that individual students bring to an institution.

Almost all previous studies on attrition, whether they have involved multiple or single institutions, have focused on the traditional student. This is a study of a single institution. The institution involved is non-traditional, at least to the extent that a majority of the students attend part-time, and to the extent that the average age of the student body is twenty-seven years.

Higher education in the United States has frequently been characterized by its diversity and is proud of that diversity. As the basic characteristics of the population evolve, so too do the characteristics of the population of students attending colleges and universities. Non-traditional institutions will probably continue to evolve and play a more prominent role in higher education. Little is known about student persistence in non-traditional institutions, thus the rationale for this study is to provide additional understanding of the nature of attrition at non-traditional institutions.

General Hypothesis

It was hypothesized that the basic congruency model proposed by Tinto is appropriate for the college used in this study. This study attempted to demonstrate that factors that predict attrition could be formed from among background variables coupled with variables describing such factors as student expectations about college, goals, commitments, and reasons for attending college.

Another part of the hypothesis was that the attrition phenonemon is multi-faceted. This study attempted to show that variables make better predictors when formed from a sequence of "lower level" variables and that a model to predict attrition will work better when using a combina- of variables rather than using variables one at a time.

Finally, it was hypothesized that the variables which predict attrition would not be the same for traditional and non-traditional students. To test this part of the hypothesis, Tinto's basic model was extended to include data related to the students' environment external to the college. Variables which most significantly predicted attrition and retention for non-traditional students were compared with the most significant predictor variables for traditional students.

Brief Description of the Study

The study involved the design of questionnaires to be completed by two samples of students during the first few weeks of the fall semester in 1978. The results of the questionnaires were subjected to factor analysis and scores were calculated for each factor for each student. These scores were also subjected to factor analysis and a second set of

scores related to each factor were calculated. Two-thirds of the student questionnaires were used in this analysis. The remaining third was retained for use as a comparison group.

The questionnaire of each student was coded as having returned to college for the Spring Semester, 1979. The second set of factor scores, combined with variables describing student demographic characteristics and means of financial support, was entered into a discriminant analysis which calculated discriminant formulas for returning and non-returning students. Discriminant coefficients were calculated for different subpopulations, and the various sets of coefficients were saved for subsequent use in the study.

A model was developed to predict which students would return to college. The model was designed to make the predictions based upon any given subset of the raw data which appears in the questionnaires and/or any given subset of the first or second set of scores resulting from the factor analyses.

Thus the model is a tool to test the basic congruency argument, and permits different definitions of congruency for various subsets of the student body. The first step in the modeling process involves using a discriminant analysis on the set of data selected for the current execution of the model. The discriminant analysis suggests which variables are significant predictors and calculates discriminant coefficients for entry into the second step of the modeling process. The second step of the modeling process involves executing a FORTRAN program to perform the actual predictions. The variables suggested as significant by the discriminant analysis and the corresponding coefficients are the basic

input data for this step of the process.

The algorithm for the model, the results of applying the model, an analysis of the variables suggested by the model as appropriate predictors of attrition and retention, and a discussion of the congruent nature of the variables comprise the results of the research.

Definition of Terms

Attrition. For the purpose of this study, attrition is a term applied to those students who attended the college being studied in the fall, 1978, and who did not return for the spring, 1979, regular academic session.

Full-time student. Any student enrolled for twelve or more credit hours during a regular academic session.

Part-time student. Any student enrolled for eleven or fewer credits during a regular academic session.

Orientation student. A student who chose to attend an orientation program prior to the beginning of the Fall Semester, 1978.

Status. When used generically, full-time or part-time status. Other types of status will be identified (e.g., marital status).

Continuing Student. A student who was in a Sophomore, Junior, or Senior level class during the time when the survey was made and who had not attended the orientation program.

GPA. Grade Point Average.

SES. Socio-economic Status.

Limitations of the Study

Results may be unique to the college being studied. Additional
studies will be required to determine whether the analysis works for
longitudinal purposes. Two other limitations directly relate to the
possibility of different reasons for attrition between fall and spring
semesters and whether students "stop out" or drop out" of the College.
The first of these questions may be answered by repeated administration
of the study; the second will require a different research design. The
question of whether there is a bias as a result of the sampling tech-
nique can also be answered through repeated administration of the instru-
ment. No attempt was made to evaluate such variables as exposure to
counseling, methods of instruction, peer group interaction, or other
intervention strategies.

Orientation to the Study

A review of the literature is reported in Chapter II. The chapter
contains both a summary of previous research and an outline of statisti-
cal methods commonly used to study similar problems. The summary of
previous studies begins with a general review of several previous syn-
theses of the literature followed by specific results from other studies.
Also contained in Chapter II is a review of the various definitions of
the term "attrition" and a summary organized in terms of selected cate-
gories of results to date. A summary concludes the chapter.

In Chapter III the design of the study is discussed in detail. A
pair of questionnaires has been developed to gather the appropriate data,
and the reliability coefficients which were computed for the instruments

are reported. In addition, Chapter III contains a description of the population studied, data gathering procedures, a list of the independent variables, a description of the statistical analysis performed, and the specific hypothesis for the study.

Chapter III also includes a separate section on Instrumentation. This section provides a description of the pilot study for the project and a review of the development and statistical analysis of the questionnaires. A summary concludes the chapter. In Chapter IV the hypothesis is restated and the conclusions and outcomes of the research are presented. Chapter V consists of a review of the study and a summary of the research. Implications for future research are considered.

CHAPTER II: PREVIOUS RESEARCH

Attrition is a problem which has been studied and reported in great detail and for many years. It is a problem common in institutions of higher learning, though interest in the problem will probably intensify during the next decade because of the potential enrollment problems facing colleges and universities during that time. Although some of the research mentioned in this chapter is somewhat beyond the scope of this study (e.g., personality studies and multi-institutional studies), the results are included to indicate the breadth and depth of research on attrition.

The chapter is organized around several themes, beginning with a review of the various definitions of the term "attrition." The remainder of the chapter moves from a general orientation to specific results, with a review of several syntheses of the literature as the most general level. The next level is a brief review of the work by Astin (1975,1977), some comments by Feldman and Newcomb (1969), and a review of a number of other efforts. The purpose of that section is to emphasize the multi-faceted nature of the problem, and thus the results are reported by study rather than by category. The reader should note that only selected studies are included in that section. The selection is designed to demonstrate the breadth, rather than the depth, of previous research. A detailed review of factors relevant to this dissertation follows and is organized around four major themes: demographic factors, academic factors, personal factors, and environmental factors. The last section contains a review of the statistical methodology used to study the problem.

The methodology section contains a discussion of population, character-

istics studied (i.e., design), and statistics used by previous investi-

gators, and will provide a transition to Chapter III, Methodology. A

summary concludes the chapter.

Attrition Defined

One of the problems that hinders effective generalization of the

results of research on attrition is the lack of a consistently used defi-

nition of the term. What follows is a review of the various uses of the

term, primarily to emphasize that the results reported in the remainder

of the chapter, while generally compatible, are not always directly com-

parable. Generalizations obviously break down when comparisons are made

between institutions of different size, type, control, location, type of

student, and mission, and the issue is further confounded when different

researchers apply different concepts of attrition.

Summerskill notes that various studies of attrition have included

students lost to separate academic divisions of a college, lost to the

college as a whole (disregarding transfers), or lost to higher education

as a whole (1962, p. 629). Attrition rates have been computed on the

basis of those who have graduated in four years, graduated eventually,

and/or some combination of these two concepts (Summerskill, 1962, pp.

629-630). Others have noted similar patterns (Cope and Hannah, 1975,

p. 2; Irvine, 1965, p. 32; Pantages and Creedon, 1978, pp. 51-52; Tinto,

1975, pp. 89-90) and have commented on the problems posed by the lack of

consistency.

Astin defined dropouts as students who, after four years were neither

stopouts nor persisters (1975, pp. 9-10). To Astin, a dropout was any student who, after four years, was not enrolled in graduate or professional school, did not have a bachelor's (or higher) degree, was not currently enrolled full-time as an undergraduate, and/or was no longer pursuing a degree. He eliminated those students whose initial aspirations did not include attainment of a degree—something most other researchers fail to do. For later reference, the reader should note the full-time enrollment requirement in Astin's population.

Most studies do not have dropouts segmented into subgroups, and the omission has prompted conflicting comments. Tinto, for example, noted the failure of some researchers to distinguish the dropout resulting from academic failure from that of voluntary withdrawal and suggested that this lack of separation has resulted in at least some of the conflicting results (1975, p. 89). He suggested that findings which indicate academic ability to be inversely related to dropout, unrelated to dropout, and directly related to dropout are typical examples of such conflicting results (1975, p. 90). On the other hand, Pantages and Creedon suggest that making a distinction between voluntary and nonvoluntary withdrawals (academic dismissal) is not appropriate because such a distinction tends to ignore the factors which caused poor academic performance in the first place. They claim that it is these other factors that actually influence the decision to drop out, not the poor grades resulting from these factors (1975, p. 52).

Most suggestions for improving the definition include some form of segmentation. Cope and Hannah suggest that the characteristics of the institution and the reasons for enrollment in the first place should be

made part of the definition (1975, p. 9), and Pantages and Creedon

suggest a four-way analysis of subcategories of dropout and non-dropout

groups--persisters, GPA less than 2.00; persisters, GPA greater than

2.00; dropouts, GPA greater than 2.00; dropouts, GPA less than 2.00

(1978, pp. 52-53).

Finally, Panos and Astin take issue with those who suggest that

segmentation should somehow distinguish between those who withdraw on a

temporary basis as opposed to those who represent a permanent loss to

higher education. The basis of their complaint is that such a definition

would require the investigator to wait until all his subjects had either

completed their education or had died, (1968, p. 68), although Irvine did

use an eight-year model and reported that 49.5 percent of the students

graduated and that there was a probable eventual graduation rate of at

most 51.4 percent (1965, p. 36). Panos and Astin's point was simply that:

> . . . it is important in any research on dropouts
> that 'dropout' be unambiguously defined, and that the
> definition make sense with regard to the problem being
> investigated and to possible applications of the
> findings. (1968, p. 70).

In this study the Panos and Astin suggestions are heeded. The term

"dropout" is defined as any student enrolled in the fall, 1978 semester

who did not enroll in the spring, 1979 semester. The definition makes

sense because of the part-time, transient nature of many of the students

at the College. The problem frequently is one of predicting which stu-

dents will not return in a subsequent semester rather than of predicting

which students will drop out one, two, or three years from the point of

prediction.

Previous Syntheses

In a synthesis of the literature prior to 1962, Summerskill categorized factors associated with dropping out of college into biological and social (age, sex, socio-economic factors, hometown location and size), academic (secondary school, scholastic aptitude, academic performance at college), motivation, adjustment, illness and injury, and finances. He found that, on the average, American colleges lose approximately 50 percent of their students and that only about 40 percent graduate in four years. Another 20 percent graduate from some college at some later time. In the thirty-five studies reviewed, Summerskill found rates of attrition ranging from 12 percent to 85 percent, a result which suggests comparative research to determine whether a particular set of factors affecting attrition exists at ends of the spectrum (1962, pp. 630-634).

From Summerskill, one would conclude that prior to 1962, age and sex were not factors in attrition and that the results about socio-economic factors and hometown location and size were at best equivocal (pp. 631-633). Most studies that included one or more academic factors reported that these factors were significantly related to attrition in the obvious way, but Summerskill cautioned that students should be divided into academic successes and academic failures when including academic performance as a factor in attrition (pp. 634-637). Motivation was found to be a key factor, although Summerskill lamented the paucity of research designed to identify motivations as general or specific types (pp. 637-641). The literature indicated that 10 to 15 percent of dropouts reported adjustment problems, but that it was difficult to prove that this percentage was any different from that which would be found among persisters

(pp. 641-645). Illness, injury, and financial problems affected persis-
tence when (or if) the problems became severe; otherwise, students could
cope (pp. 645-647). Finally, he noted that we could assume multicausality
in attrition and that future investigators should avoid simplistic
approaches (e.g., single factor solutions, minimal or no significance
testing) to the problem (p. 649).

Summerskill suggested future research, especially in the area of
motivation, and concluded with the observation that the simple passing of
time would probably affect attrition. In other words, as times change,
the goals of both institutions and students also change (p. 650). Thus,
many attrition factors may tend to change, and attrition studies may need
to become a kind of cyclic re-examination of student flow.

Cope and Hannah's framework for reviewing the literature included
factors related to academic preparation, aptitude test scores, sex,
finance, goals, religious beliefs, high school or college size and loca-
tion, psychological characteristics, and institutional characteristics
(1975, pp. 10-30). Their review was designed to provide an introduction
to a sequence of chapters emphasizing the complex, multifaceted nature of
the problem, and they tended to reject single factors as either inappro-
priate or simplistic.

Thus, Cope and Hannah concluded from the literature that little
reliance can be placed on performance in high school as a predictor of
graduation (p. 12) and that the low correlations between SAT scores and
attrition indicated the inappropriateness of using SAT scores as pre-
dictor variables (p. 13). With respect to sex, they noted the ambivalent
nature of the results of the research and that many other authors have

found that there is little or no variation in the attrition rate between men and women (p. 14). Further, they concluded tentatively that financing college is not a major problem in persistence (p. 18), that choice of college major is not a factor (p. 21), but that educational goals or educational expectations at the time of entering college might be well worth considering when attempting to develop predictor variables (pp. 19-20). With respect to such things as high school size, home residence, and distance to college, Cope and Hannah simply noted the ambiguous results and concluded that it is impossible to draw specific conclusions about these factors because of the lack of consistency in the research (p. 23).

Cope and Hannah's conclusion about educational goals and expectations seems to provide a "transition of approach" from the simplistic, typically demographic approach to a more complex psychological or environmental approach. They concluded that personality studies have shed little light on the attrition phenomenon (p. 24), although they pointed out that most of these studies have been too general to be useful (p. 270). Psychological stress, as expected, is related to withdrawal, but Cope and Hannah indicate that the withdrawal is probably indicative of more basic problems that may not be a direct result of the academic environment (pp. 27-28). The research on religious preference indicates that having a religious preference (no one preference in particular) is positively associated with persistence (p. 22).

Finally, Cope and Hannah note that striking differences in attrition rates among various types of colleges have been found. Technological institutions, teacher's colleges and publicly controlled institutions

have the highest rates (p. 28). They conclude by suggesting that the various theories relative to congruence between student and environment may hold the most promising approach to the problem (p. 29).

Tinto (1975) divided the research into individual characteristics (family background, personal factors, past educational experiences, goal commitment), interaction within the college environment (academic integration, social integration, and institutional commitment), and institutional characteristics (type, quality, size). He felt that voluntary versus forced withdrawal should be considered. According to Tinto, the literature suggests that SES factors are inversely related to college persistence (p. 99), that ability (as measured by things like GPA, SAT) is a very important factor (p. 100), and that commitment and personality characteristics of dropouts make success in college more difficult for non-persisters than for persisters (p. 102). Tinto concluded that the sex of the student is related to college persistence, with a greater proportion of men finishing college than women (p. 101).

With respect to academic interaction with the college environment, Tinto turned to a congruency argument. Thus he noted that although grades have frequently been shown to be the single most important factor in predicting persistence, a number of studies have also found aptitude and/or ability scores of voluntary dropouts to be higher than either persisters or academic dismissals (p. 104). He went on to suggest that intellectual development, apart from grades, must also be congruent with the prevailing intellectual climate of the institution and concluded that both concepts (grade achievement and intellectual development) are related to congruence, thus persistence (p. 106). Tinto then used the

results from the literature and developed additional arguments for his

congruency theory by relating social integration to a student's rela-

tionship with his peers (p. 107), extracurricular activities (p. 109),

faculty and administration (p. 109), and finally the student's commitment

to the institution (p. 110). His conclusion was that many forms of

social integration are positively related to persistence (pp. 110-111).

Tinto noted a lack of appropriately controlled research on institu-

tional characteristics. His criticism was that existing research tended

to be too simplistic, to ignore control for characteristics not being

studied but which might affect attrition, and to minimize the fact that

differences in dropout rates among institutions may result from differ-

ences in the types of students admitted (p. 111). From the research he

reviewed, Tinto concluded that public four-year and two-year colleges

tend to have higher dropout rates than private institutions, possibly

because of the selectivity of private colleges (pp. 111-112); and that

the quality of a college seems to have a direct relationship to persis-

tence, higher quality colleges tending to have higher graduation rates

(p. 113). Some caution is appropriate here. Tinto's review reported

research that tended to treat quality as a function of the percentage of

faculty with doctorates and/or institutions with higher than average

income per student (p. 113). Tinto also indicated that the type of

college is roughly correlated with quality of college (p. 113). The

point of the advisory caution is not to suggest that there is a basic

flaw in the thesis, but to note, as Tinto initially suggested, that inter-

actions between student and college involving factors related to "quality"

are complex and, further, that the study of such factors on a multi-

institutional basis requires both a precision in the definition of the
term, which does not seem to exist, and the level of control that Tinto
has suggested.

In a recent review of the literature, Pantages and Creedon (1978)
included the following factors as important in a study of attrition:
demographic (age, sex, socio-economic status, hometown location and size,
size and type of high school), academic factors (high school GPA and
class rank, SAT, first-semester grades, study habits), motivational fac-
tors (goal commitment, reasons for attending, educational interests,
parental and peer-group influence), personality factors, the college
environment, and financial factors (pp. 57-81). For almost every factor
they were able to find literature which would indicate a relationship with
attrition, and other literature to indicate no relationship with attri-
tion. Their conclusions generally reflected the major thrust of the
previous studies. Age and sex appear not to be significant variables in
predicting attrition (pp. 57,58); nor is socio-economic status a particu-
larly useful tool (p. 60), at least as SES is defined by father's occupa-
tion, family income, parental education, ethnicity, and social status
(pp. 58-60). Although the results concerning hometown location and size
and type of high school are particularly ambiguous, Pantages and Creedon
conclude that neither set of factors is related to attrition (pp. 60-61).
They call for additional research and suggest that students attending
private high schools might be more persistent than those attending public
high schools (p. 62). With respect to academic factors, Pantages and
Creedon conclude that in general there are significant differences
between persisters and leavers in high school GPA and class rank (p. 62),

SAT and ACE tests (p. 63, first-semester grades (p. 64), and study habits (p. 65). They caution, however, that these factors make better predictors of attrition than of persistence and that other factors must be included to yield stronger results (p. 64).

Their conclusions related to motivational factors suggest that such factors may be "far less important in determining persistence and attrition than has been traditionally assumed" (p. 71). This suggestion was made in spite of the literature which indicated that motivational level and commitment are important (p. 65), that having vocational goals is positively related to persistence (p. 68), that parental influence is important, although the influence is certainly mediated by the parent-student relationship (p. 70), and that a positive peer-group relationship is associated with persistence (p. 70). Pantages and Creedon noted that research has failed to truly establish relationships among levels of motivation, commitment to college, strength and content of educational goals, and attrition. They supported their contention with the observation that the combined significance of all of these factors in multiple correlation analyses was still small (p. 71).

This section has reviewed the syntheses of Summerskill (1962), Cope and Hannah (1975), Tinto (1975), and Pantages and Creedon (1978). The syntheses are generally thematic and conclude that attrition is not caused by any single factor. Instead, multiple factors seem to be involved. Tinto's congruency model was introduced. In this study the multifaceted nature of the attrition phenonemon was combined with a congruency theory to form a conceptual basis for the model which was developed for predicting attrition.

Various Approaches to the Problem

This section of the review is designed to amplify the multifaceted theme developed in the previous section and to begin to shift the focus from the general to the specific level. The material is organized to present the breadth of previous approaches to studying the attrition problem, and in the following section the material is organized so that a more detailed review, by category, can be presented.

In a survey by mail to 250 persisting and 250 non-persisting students, Kowalski found several college environment factors which affected persistence. Chi-square comparisons were used, and father's educational level, medical or personal problems at home, students' satisfaction with the atmosphere at school, and students' evaluation of the attitudes of the faculty and/or their academic advisor were found to affect persistence (1977, p. 75). Kowalski also discovered a number of personal and academic characteristics that affect persistence: plans about educational goals, poor study habits, participation in class discussions, interest in school work, class attendance, use of library, lack of basic academic skills, becoming discouraged, satisfaction with college, parental pressures, the students' perception of the ability of the college to help in developing better career plans and well rounded people, better judgment, and subject area knowledge (1977, p. 76). He concluded that "students with academic and personal problems can be identified as potential dropouts" (1977, p. 77), and he recommended that the problem of attrition be considered broadly, rather than considering one specific issue at a time.

The research in Preventing Students From Dropping Out (Astin, 1975)

is among the most comprehensive work to date. From an original 1968
sample of 243,156 students, a follow-up sample of 101,000 in 1972 yielded
41,356 usable cases (41 percent). The 1968 questionnaire covered sex,
race, age, religion, past achievements, parents' income, parents' educa-
tion, parents' occupation, student's occupational plans, educational
plans, study habits, goals, daily activities, reasons for choosing
college, sources of financial aid, and student's predictions about pos-
sible college outcomes (p. 4,5). The 1972 questionnaire covered educa-
tional progress since entering college, number of years of undergraduate
attendance, degrees earned, current degree plans, a year-by-year record
of enrollment status, financial support, choice of residence, and types
of jobs held (p. 5).

The sample for Astin's study involved only full-time, first-time
freshmen at traditional colleges (p. 147). The proportion of older stu-
dents in the sample was small--3 percent were 20 or 21 and 5 percent were
over 21 (p. 44). The special problems of community colleges and other
commuter institutions were not a part of the study (p. 147).

Of all the factors in Astin's study, those which had the best pre-
dictive characteristics were high school grades, degree aspirations, and
religious background. Next in importance were study habits, having high
expectations about academic performance in college, having highly edu-
cated parents, being married (for men), and being single (for women)
(p. 174).

In _Four Critical Years_, Astin (1977) reported that entering freshmen
characteristics produced only a modest prediction of persistence. He
stereotyped the persister as an individual with high grades, high

aspirations, affluent parents, and an ability to postpone gratification.
The potential dropout was seen as independent, hedonistic, having low
aspirations, low grades, or planning to marry while in college. These
factors were defined by Astin as a result of the patterns of answers on
questionnaires completed by the students. He indicated that the most
important environmental characteristic associated with college persis-
tence is living in a dormitory during the freshman year (p. 109). In
his summary of attrition he pointed out that all forms of involvement
--research, honors programs, social fraternities, and clubs--are posi-
tively associated with persistence, but that the single most important
variable in this area is the student's grade point average (p. 260).

Feldman and Newcomb (1969) described the problem from a slightly
different vantage point, and while they did not directly perform research,
their theory is directly related to Tinto's work, and thus is included
here for completeness. Their theory is based on the concept of
"congruence" or the fit between the average level of specific needs of
students and particular environmental pressures (p. 133). Feldman and
Newcomb suggest that by measuring the correlation between various measures
of students' needs and environmental pressure, also called "press," one
can discover the degree of "congruence" between the student and his or her
environment. Attrition then becomes a function of the congruence between
the needs, interests, and abilities of the student and the demands,
rewards, and constraints of the particular college setting (p. 289). The
congruence theory does not ignore the fact that motivation and psychologi-
cal or other background characteristics are related to attrition. The
essence of the theory is to study why certain characteristics seem to fit

better at one college than at another or why some students are more moti-
vated than others to persist in college.

Feldman and Newcomb believe motivation to be a function of the
institution: "A given student characteristic that may encourage with-
drawal at one type of college may be irrelevant at another type, and may
even promote persistence at a third" (p. 291). They conclude their com-
ments on incongruence and withdrawal by observing that perhaps the best
relationship between a student and college would be one which fostered a
series of "not-too-threatening discontinuities" (incongruences), so that
a student might gradually accept what is described as: "... those dis-
crepancies that can stimulate growth" (p. 295).

Tinto (1975) reflected on Durkheim's theory of suicide--that suicide
is more likely to occur when individuals are insufficiently integrated
into the fabric of society--and noted that if one chose to treat college
as a social system, then one could treat dropout from that system in a
manner analogous to that of suicide in a larger society (p. 91). Further-
more, Tinto either consciously or unconsciously linked to Feldman and
Newcomb's theory of incongruence by suggesting that the conditions which
cause a student to drop out of college are in part a result of "insuffi-
cient congruency with the prevailing value patterns of the college col-
lectively" (p. 291), and later "the higher the degree of integration . . .
into the college systems, the greater will be his commitment to the spe-
cific institution and to the goal of college completion" (p. 296).

Tinto developed a conceptual model of attrition as a longitudinal
process that involves a high degree of interaction between a student's
background, commitment, performance, and experiences in college.

These elements interact while the student is in college, affecting his decision to remain, transfer, or drop out. The conceptual model can accept any of a variety of external forces, although no specific external force is part of the model. Finally, the model emphasizes the notion that individual perceptions of given situations differ, thus accounting for at least part of the results that indicate apparently different reactions to similar sets of attrition factors (pp. 95-99).

In addition, there have been many studies, less comprehensive than the previous ones that must be noted. Bayer (1968) employed thirty-eight variables in a study of 100,000 twelfth grade students with a follow-up yielding 8,576 applicable and usable results. The 38 variables were condensed into the following factors: ability, interests, temperament, socio-economic, ethnic/religious, home residence, family orientation, high school, and college commitment. After including all the variables in a multiple regression equation, Bayer was able to account for less than 30 percent of the variance in dropping out versus senior college for women and less than 20 percent for men. Based on the percentages accounted for, Bayer felt that further research should employ other than "traditional" background variables, and that subgrouping financial factors, poor academic performance, marriage, and parenthood with the type of college attended might increase predictive ability (p. 314). This study partially follows the lead suggested by Bayer. Questions on a questionnaire are subgrouped into twelve sections and factor analyses are used to extract predictor variables from each of the sections.

Peng and Fetters (1978) performed a longitudinal study of 4539 students from four-year institutions and 1378 from two-year institutions

and included 1800 institutions. They calculated eleven factors: SES
(parents' education, income, and occupation), sex, race, high school
curriculum (college prep, vocational, or technical), high school achieve-
ment, academic ability, educational aspirations, full- or part-time
employment, scholarship recipient, loan recipient, and college achieve-
ment, and found that neither academic ability nor financial aid was
related to withdrawal. SES was significantly related after other pre-
dictor variables were controlled. Women students were more likely to
withdraw only in two-year colleges, and white students were more likely
to withdraw when other variables were controlled. The high school pro-
gram, college grades, and educational aspirations accounted for most of
the variance in withdrawal behavior.

In a study which dealt specifically with an urban commuting institu-
tion, Zaccaria and Creaser (1971) investigated differences in ability,
personality characteristics, and social status between persisters after
five years versus dropouts at the University of Illinois at Chicago
Circle. They found that graduates did not significantly differ from
achieving dropouts on high school rank or the ACT composite score, and
that non-achieving dropouts did not differ from the failures on the above
two measures. However, both of the former groups had significantly
(p<.05) higher ACT composite scores and high school ranks than either of
the latter groups. Sex made no difference in the result (pp. 287-288).
With respect to social status, the non-achieving withdrawal group repre-
sented (for males only) a lower social status than any of the other three
groups, a result which caused the authors to speculate that males from
lower socio-economic backgrounds were more likely to drop out of college

when confronted with failure than other groups (p. 290). The findings with respect to personality factors were less certain. After controlling for scholastic standing, the authors found that students who persisted to graduation seemed to have different personality needs than those who withdrew. All students who withdrew in good academic standing appeared to conform less to rules and regulations, and males who withdrew seemed more assertive than those who persisted to graduation (p. 290). The authors failed to caution their readers that the population for the study was selected from a group who participated (presumably on a voluntary basis) in a freshman summer guidance program prior to their enrollment in the fall.

Some researchers have emphasized data available prior to admission or readily available from institutional data bases once the student was admitted. Thus Stork and Berger (1978) collected twenty-two variables known to administrators at the time the admissions decision was made and employed a linear discriminant analysis with persisters and leavers as the two groups in which students were to be classified. The population was a random sample of 120 persisters and 120 leavers. The analysis correctly classified 61.5 percent of the students, and a subsequent univariate t-test demonstrated significant differences (p<.05) for distance from college, sex, high school GPA, number of high schools attended, and SAT-V.

None of the above studies are longitudinal. In a relatively early effort to recognize the longitudinal nature of the problem, Irvine (1965) traced students who entered the University of Georgia as freshmen in 1955. His survey considered students who had graduated during the following

8-year period or who were still enrolled in any college in 1963. Irvine found that 35 percent of the students graduated from the University in four years, and 45 percent at the end of eight years. Fifty percent were found to have graduated from some institution within the eight-year period, and, based on enrollments at the end of eight years, there was an estimated maximum graduation rate of 51 percent. Women graduated at a faster rate than men at the end of four years (39 percent versus 31 percent), but men graduated at a higher rate than women at the end of eight years (52 percent versus 47 percent) (p. 39).

This section was organized to demonstrate the breadth of previous approaches to the problem. Previous efforts have involved single institutions as well as multiple institutions and have incorporated factors from single themes (e.g., demographic or academic) and/or from combinations of themes. A summary of this section is part of the more general summary at the end of this chapter.

Results by Category

In this section categories relevant to this particular study are reviewed. In Chapter III a mapping will be developed to relate these categories to the categories in the questionnaires used in this study.

Age   Astin reports that older students, particularly older women, are more likely to drop out than traditional aged students (1975, p. 44). He also notes that this finding is consistent with Newman (1965) and Trent and Medsker (1967). It is important to note that only 3 percent of the students in Astin's study were 20 or 21 years old and only 5 percent were over 21 years old.

Other research does not agree with Astin's results. The conclusion
that rates of attrition are not a function of age is supported by
Suddarth (1957, cited in Summerskill, 1962), Goble (1957, p. 61), Bragg
(1956, p. 201). Other research does support Astin's results (Trent and
Ruyle, 1965, p. 73; Sexton, 1965, p. 306), although Pantages and Creedon
suggest that the reader view this result with caution because of the
environmental and social factors that accompany the older student to
college (1978, p. 57). Summerskill concludes that age is not a factor in
attrition, although he notes that, "older undergraduates may encounter
more obstacles to graduation" (1962, p. 631).

If the environmental and social factors that are typically related
to the older student are a cause of an increased rate of attrition, then
age becomes a de facto cause in its own right. As noted elsewhere, little
significant research has been completed on the age factor, although the
lack does not appear to have been by design. Most students in the past
were from the 18-22 year-old age group, and college and university poli-
cies were designed to serve that traditional population. As enrollments
decline, as the general age of the population as a whole advances, and as
more and more students opt for part-time enrollment thus lengthening the
college experience, the age factor may receive increased attention in the
research on attrition.

Sex   The research which includes sex as a factor in attrition has also
yielded ambiguous results. Studies which found significant sex differ-
ences in the rate of dropping out--men at a higher rate than women--include
Hill, Trent and Ruyle (1965, p. 71), Nelson (1966, p. 1049), and Demos
(1968, p. 682). On the other hand Holmes (1959, p. 295), Astin (1964,

p. 221), and Tinto (1975, p. 101) reported that women drop out at a slightly higher rate than men. The preponderance of the research, however, indicates little or no sex difference in attrition rates (Johnson, 1954, p. 3878; Bragg, 1956, p. 202; Summerskill and Darling, 1955, pp. 356-357). Finally, in his synthesis of the literature, Summerskill concludes that sex does not affect attrition (1962, p. 631), Cope and Hannah conclude that it does, at least when reasons for withdrawing are sex related (1975, p. 13), and Pantages and Creedon conclude that sex is not a significant variable unless it is combined with other variables such as scholastic, environmental, or institutional factors (1978, p. 58).

Socio-economic Factors   Research findings on socio-economic factors (SES factors) are also inconclusive. Summerskill, for example, notes that college counselling experiences suggest that SES factors affect adjustment and are, therefore, factors in attrition--and proceeds to observe that research findings on such a hypothesis are equivocal (1962, p. 632). Pantages and Creedon state that SES factors are of little value in predicting attrition (1978, p. 60), and Cope and Hannah choose to ignore SES factors as separate entities entirely, incorporating the factors into financial factors (1975, pp. 16-19). Cope's and Hannah's reasoning is that those studies which consider financial factors also tend to consider various SES indices and then report a negative correlation between persistence and SES factors (1975, p. 17).

Some studies support a well defined relationship between certain SES factors and attrition. The level of education of one or both of the parents has been suggested as having an effect on persistence in several studies (Astin, 1964, p. 293; Warriner et al, 1966, p. 466; Chase, 1970,

p. 67; Eckland, 1965, p. 41; Panos and Astin, 1968, p. 63,64). On the other hand Rossman and Kirk found no evidence that the level of parental education is related to a student's chances of persisting (1970, p. 60), and Little (1959, p. 240) did not find a significant relationship between the level or type of parents' occupation and the attrition of their children. Although Little's research did not relate level of education and level of occupation, one might suspect that such a relationship exists and conclude that Little's findings were consistent with Rossmann and Kirk's. In general, the evidence seems to reflect a positive relationship between level of parental education and student persistence.

The research on many of the other standard SES factors follows a pattern of controlling for one of more academic factors (high school rank, high school GPA, SAT). Thus Pearlman (1952), as cited in Summerskill (1962, p. 632), found no difference in academic performance when controls were made on high school aptitude and high school performance with reference to parental ages, nativity, home language usage, parental occupation, and family income. Although academic performance is not necessarily related to attrition, the result may apply. Astin held high school rank and SAT scores constant and found no significant differences in the attrition rate for students who were black, Oriental, or American Indian (1973). In the same study, however, Astin did find that Jewish students are more likely to graduate in four years than non-Jewish students and that Chicano students had a substantially lower probability of graduation. In a study which conflicts with the above, Morrisey measured family independence, social status, and liberalism, while controlling for academic ability, and found an inverse relationship between the SES variables and attrition

(1971, p. 281-282). He suggested that students from families with lower SES may have a greater desire to achieve (p. 283)--a result which may actually be a motivational factor. But Sewell and Shah (1967, p. 22) found social status to be directly related to attrition after controlling for intelligence, and Tinto (1975, p. 119) reported the same conclusion.

Hometown location and size seem to have no significant effect on academic performance (Fishman and Pasanella, 1960, p. 303) or attrition (Johansson and Rossmann, 1973, p. 9). Summerskill (1962, p. 633) cites several studies to the contrary, but goes on to question the results and to suggest that research should be accomplished which goes beyond basic correlations between persistence and hometown location and/or size. His hypothesis is that the underlying factors are really a disparity between educational and cultural characteristics of given colleges and the educational and cultural characteristics of the hometowns of the students attending these colleges (p. 633). To some extent, educational and cultural characteristics are probably a function of community size, however, and to that extent (assuming Summerskill's hypothesis is true) hometown size indirectly becomes a factor in attrition.

Arguments similar to the preceeding can be made for the factors related to the size of the high school. Pantages and Creedon conclude that there is no relation between attrition and high school size (1978, p. 61) and studies by Panos and Astin (1968, p. 64) and Slocum (1965, p. 57), support the conclusion. A study by Freedman (1966, pp. 17-19), however, suggests that the type of high school may be important. This study found that attrition rates were lower for students from private high schools. Cope and Hannah conclude that the size of a student's high school appears

unrelated to persistence (1975, p. 22) and that findings about hometown

size and distance from college are inconclusive (1975, pp. 22-23). They

summarize the problem in this way:

> Thus studies relating to school size, home residence,
> distance to college, and the like to dropping out or
> academic achievement permit no easy generalization.
> School or community size may be closely related to
> levels of socio-economic status, differences in facili-
> ties, teacher salaries, class size, available curricula,
> and differences in communities . . . All of these studies
> employing different definitions of the dropout, employing
> divergent variables, carried out in diverse institutions
> and at various times, and utilizing dissimilar samples
> and research techniques are virtually impossible to
> synthesize. (1975, p. 23).

One might conclude that the latter part of their statement is true for the

research on attrition in general.

Financial Factors   As noted earlier, Cope and Hannah relate financial

factors to SES factors and conclude that financing college is not a major

problem in persistence (1975, p. 18). Astin noted several studies which

reported a direct relationship between family income and attrition (higher

income, less attrition) but observed that when income was incorporated

into regression formulas with family background, student ability and

motivation, family income failed to add any predictive ability to the

contribution of the other variables (1975, p. 35). Summerskill's review

suggested that financial difficulty was an important cause of attrition,

but concluded that there was no meaningful statistic which described the

rate of attrition nationally due to financial difficulty (1962, p. 646-

647).

If a student and/or his or her family simply cannot afford college,

and no other support can be found, then the student is obviously forced

to leave. The issues related to family income probably are, as Cope and Hannah point out, SES factors, and thus the questions related to financial factors are not whether or not financial problems exist, but rather what kind and how much financial support is included. Astin reports that receiving support from parents, receiving major support from spouse, scholarships or grants, participation in work study programs, and ROTC support all increase chances of persistence, although at varying rates (1975, pp. 69-71). Any form of aid is more effective if it is not combined with other forms (p. 71). Reliance on loans, savings or other assets, or the GI-bill decreases chances of persistence, although Astin notes that the result for the GI-bill may be confounded by the effects of being a veteran (p. 70). With respect to scholarships or grants, Astin's results are supported by Blanchfield (1971, p. 3). Blanchfield's research also supports Astin's conclusion about the effect of loans (1971, p. 4). Astin also reports that part-time employment is beneficial in decreasing attrition, especially among black students, and that on-campus employment is preferable to off-campus employment (1975, p. 87). Summerskill's review indicated that the results on student employment were equivocal (1962, p. 647).

To conclude, Pantages and Creedon note that interpreting correlational studies of financial factors and attrition is difficult for several reasons. The cost of a college education and the financial resources of individual institutions vary, studies of the relationship between financial aid and attrition have not controlled for academic ability, and finally, it appears that working while attending college is simply a poor factor to use for predicting attrition (1978, p. 81).

Academic Factors   Research on the relationship between academic factors
and student persistence has focused on high school preparation, scholas-
tic aptitude, performance in college, and study habits. Academic factors
frequently have been found to be the single most important set of factors
in predicting attrition, and high school preparation has been suggested
as the most important of these factors (Summerskill, 1962, p. 634; Astin,
1975, p. 30; Pantages and Creedon, 1978, pp. 62-65).

In their review of the literature Pantages and Creedon cite ten
studies (Blanchfield, 1971; Bragg, 1956; Chase, 1970; Little, 1959;
Morrisey, 1971; Panos and Astin, 1968; Scannell, 1960; Slocum, 1956;
Summerskill, 1962; Waller, 1964) which found a positive relationship be-
tween high school grade point average and/or rank and persistence in col-
lege (1978, p. 62). Summerskill states that grades in secondary school
are unequivocally related to attrition from college (1962, p. 634), but
goes on to observe that it is difficult to give a meaningful figure de-
scribing the extent of the relationship because of differences in the
studies demonstrating the result. On the other hand, Munger (1956,
p. 243; 1957, p. 240) found no significant difference in high school GPA
or class rank between dropouts and non-dropouts, and others also report
that high school performance does not predict persistence in college
(Fullmer, 1956, p. 445; Morrisey, 1971, p. 283). This latter result is
further amplified by Eckland. His conclusion is that high school grade
point average and rank fail to identify those students who will stop out
as opposed to drop out (1964, p. 72). In another article Eckland demon-
strates that high school rank is only about half as effective in predic-
ting permanent dropouts as it is in predicting students who will stop out

at least once (1964b, p. 414). Finally Cope and Hannah note that although
the City University of New York had adopted an open admissions policy,
some early research (Eagle, 1973; Lavin, 1974) indicates that retention
over four years was comparable to, and may have exceeded, national norms
1975, p. 12). They conclude, in contrast to the research cited at the
beginning of this section, that ". . . little reliance can be placed on
performance in high school as a predictor of graduation" (p. 12).

Other academic factors (scholastic aptitude, college performance,
and study habits) have also been used to predict attrition. The pattern
of the results of research on the factors is that they are not as power-
ful as high school average in predicting attrition. Astin notes this
conclusion for SAT and ACT scores, especially among black students (1975,
p. 32). Summerskill's synthesis of the literature reported that twelve of
thirteen studies he reviewed showed aptitude differences between college
graduates and dropouts, although not all the differences were statisti-
cally significant (1962, p. 635). The studies were not identified.
Sewell and Shah also observed the difference (1967, p. 23), but others
have not been able to identify a significant difference between persisters
and leavers (Blanchfield, 1971, p. 4; Williams, 1966, p. 108; Munger,
1957, p. 220). Gekowski and Schwartz went on to observe that in many
studies of the relationship between scholastic aptitude and attrition,
the aptitude scores of students who did not persist, although lower than
those of persisters, were still high enough to predict persistence in
college (1961, p. 193).

Basically the literature cautions against an overemphasis on using
aptitude scores as a basis for predicting attrition. Cope and Hannah

note that even when aptitude is combined with high school grades (a "best" predictor), ". . . the results are disappointing, even if they are 'statistically significant' from the researcher's point of view and classed as 'important indicators of success' by the firms marketing these tests" (1975, p. 12). Marks noted the limitations of using aptitude scores for predicting attrition (1967, p. 211), and still others call for a multivariate approach to the problem with aptitude as only one of the factors (Summerskill, 1962, p. 635; Pantages and Creedon, 1978, p. 65).

Performance while in college, typically based upon first-semester college grades, is a fairly common factor used to study the attrition phenomenon. Summerskill reported that a clear relationship existed between college grades and college dropouts in at least 35 studies (1962, p. 636) and Pantages and Creedon added seven more to the list. One would be surprised if there were not a relationship between first-semester grades and attrition, although Munger reported just such a result (1957, p. 221). After all, most institutions have academic policies which force students with low grades to resign.

Holmes found no difference in first-semester grades between persistors and "voluntary" dropouts (1959, p. 300). Astin went on to examine this result in more detail and found, in addition to the expected result that practically every student with a C- or lower average dropped out, that there was a relationship even among students with passing grades. The dropout rate for students with B averages was nearly twice that of students with A averages (1975, p. 98). Astin's results reinforced a finding by Summerskill, who noted that students with low grades were highly likely to drop out while students with high grades may drop out

(1962, p. 636). This caution by Summerskill (that poor grades are a more stable predictor of attrition than good grades are a predictor of retention) was also noted by Pantages and Creedon (1978, p. 64), and others report similar conclusions (Barger and Hall, 1964, p. 346; Demos, 1968, p. 684).

The final academic factor which has received relatively consistent attention is student study habits. The conclusions about this factor are equally consistent--essentially, a direct relationship exists between poor study habits and attrition (Stone and Ryan, 1964, p. 189; Sexton, 1965, p. 306; Trent and Ruyle, 1965, p. 71; Pantages and Creedon, 1978, p. 65; Astin, 1975, pp. 39-40).

Individual Factors   Factors related to educational aspirations and expectations about college could be useful in studying attrition (Astin, 1975, pp. 37-38 and 40-41; Cope and Hannah, 1975, p. 20). Astin reports that students who aspire to a doctorate or professional degree have the least chance of dropping out, while those who aspire to achieve only a bachelor's degree have the greatest chance (p. 38). It should be noted that this aspect of Astin's study was limited to students who aspired to at least a bachelor's degree. In addition, Astin reported that a positive response to students' predictions of dropping out (that they will) or to the prediction of getting married while in college (for women) is positively related to attrition (pp. 40-43). The concept of determining to graduate or to go to graduate school, sometimes called "goal commitment," has also been studied and found to be positively related to persistence by Panos and Astin (1968, p. 63), Rossmann and Kirk (1970, p. 61), Marks (1967, p. 218), and Trent and Ruyle (1965, p. 71). Some

research on the reasons for attending college has concluded that those
students with set goals prior to entering college have a better chance of
success (Hackman and Dysinger, 1979, p. 322; Slater, 1957, p. 438).
Others emphasize that the goal should be vocational in order to have a
positive effect on persistence (Freedman, 1956, p. 27; Sexton, 1965,
p. 310). Summerskill lists nine such results from the research prior to
1962, although he pointed out that one ought to consider the match between
institutional characteristics and individual goals (medicine, agriculture,
law, etc.) as part of the research (1962, pp. 639-640). Heist had con-
sidered such relationships (compatability of students' goals and educa-
tional philosophy of the institution) and found that a student's chances
of persisting were greatly increased if the relationships were compatable
(1961, p. 367). However, among Turner's results was the observation that
persisters simply saw more reasons for attending (1970, p. 4), and others
have found no significant effect of vocational goals on attrition (Barger
and Hall, 1965, p. 87; Panos and Astin, 1968, p. 64).

One way to research reasons for coming to college is to consider the
student's major. Astin's listing of fields with the lowest dropout rates
contains mostly professional areas (1975, p. 39). On the other hand,
Cope and Hannah conclude that there is no consistent evidence to suggest
retention rates are better in any field of study (1975, p. 21).

To summarize, the research attempting to conclude that attitudes,
motivation, and expectations are related to attrition has yielded ambig-
uous results. Pantages and Creedon make a slightly stronger statement:
"Research has failed to establish relationships among levels of motivation,
commitment to the college, the strength and content of educational goals,

and attrition" (1978, p. 71).

Perhaps Summerskill explained the dilemma best. While he did not refute the results indicating a relation between motivational factors and attrition, he did note, at length, the problems associated with the design and implementation of such studies (1962, pp. 637-643). In commenting on the thought that the largest number of dropouts involve motivational forces, he states: "This is a difficult proposition to prove or develop because the motivational psychology of college students is still in a vague and crude state and there has been little critical experimentation" (1962, pp. 637-638). and later: "The trouble here is that we do not know what motivational forces are actually predictive of college success and we do not know how to accurately assess such motives in students" (1962, p. 639). Williams reinforces the idea (1966, p. 108) and Pantages and Creedon went on to call for additional research, in spite of the difficulties inherent in such studies (1978, p. 65).

In this study factors describing attitudes, motivation, and expectations are included. These factors, which form part of the core of the congruency theory, are included with an expanded set of variables which describe a student's background, current environment, satisfaction with college, and use of facilities. It is this combination, extending the congruency theory to include factors external to the college environment which forms the set of variables which are used to discriminate between persisters and non-persisters in this study.

College Environmental Factors   Much of the research on college environment indicates that each college has a climate of its own and that this climate attracts a particular type of student (Centra, 1971, p. 13;

Heath, 1968, p. 26; Kamens, 1971, p. 293). Not all the factors which

define a typical college environment are present at urban, commuting

institutions, and part-time, older students probably interact differently

with whatever environmental factors do exist--thus creating the need to

consider such factors in this study.

Some literature also supports the idea that an analysis of the

interaction between the student and the college environment might shed

additional light on the attrition phenomenon (Holland, 1957, p. 437;

Mcconnell and Heist, 1959, p. 442; Pace, 1962, p. 276; Stern, 1970, p. 8;

Thistlewaite, 1959, p. 190). Pace and Stern make the important observa-

tion that studies of this type have value both in the study of attrition

at individual institutions and in the general study of the interactions

between student and college (1958, p. 227). They also note that cultures

in higher education may be viewed as a system of complex environmental

presses, a system which is "intended to influence the development of

students toward the attainment of important goals of higher education"

(1958, p. 277).

In his longitudinal study, Astin (1975) included only items such as

size, tuition, control, and geographic region as part of the college

environment--thus excluding student involvement and/or interaction. How-

ever, he did note throughout his report that student involvement was an

important factor in persistence. In his later work, Astin (1977) assoc-

iated involvement with student satisfaction (p. 186) and specifically

noted that expanding opportunities for part-time student employment on

campus is positively associated with persistence (p. 187). Robin and

Johnson suggested that students who withdrew usually failed to discuss

their problems with professors (1969, p. 178), and similar findings are reported by Pascarella and Terenzini (1977, p. 550), Hannah (1969, p. 398), and Slocum (1956, p. 61). Pascarella and Terenzini went on to reflect on one of Tinto's conclusions--that a high level of student-faculty interaction is positively associated with persistence--and demonstrated that at Syracuse the type of interaction is important. Interaction focusing on course related material or intellectual concerns contributed most to discriminating between persisters and leavers (1977, p. 541). Later Terenzini and Pascarella, in a follow-up report, emphasized informal student contact with faculty members and suggested that freshman attrition could also be reduced through the development of a broad-based effort involving social and academic integration into the college environment (1977, p. 548).

Terenzini and Pascarella's conclusion lends support to the research that suggests that participation in extracurricular activities is an important factor in persistence (Chase, 1970, p. 67; Sexton, 1965, p. 397; Tinto, 1975, p. 107). Astin found that participation in honors programs and/or foreign study (not travel alone) are associated with a modest decrease in the chances of dropping out (1975, p. 107), and that participation in extracurricular activities, especially membership in social fraternities or sororities, is significantly related to persistence (1975, p. 108). Some of the earlier research also found a positive relationship between persistence and extracurricular activities (Goble, 1957, p. 61; Mercer, 1941, p. 537).

Summerskill, who did not include college environment as part of his review, noted in a section that emphasized adjustment in general that

while there had not been enough research at that time to enable higher

education to reduce attrition by adopting an extracurricular policy,

there had been sufficient research to question some of the assumptions

about the harmful effects of extracurricular activities (1962, p. 645).

But other more recent efforts continue to raise questions. Although peer

relationships were reported to be the most valuable, Hannah noted that

69 percent of a group of potential dropouts felt extracurricular activi-

ties were valuable (1969, p. 401), and Panos and Astin found that stu-

dents were more likely to drop out of schools where there was relatively

frequent dating (1968, p. 66).

Finally, Pantages and Creedon emphasize the "college fit" or con-

gruency theory: "The degree to which the attitudes and values of the

student correspond with those of the institution is also the degree to

which the student is likely to persist at the institution" (1978, p. 80).

They note that students have different motivations for attending differ-

ent types of institutions, which in turn suggests that different institu-

tions attract students with specific personality characteristics (1978,

p. 80). An extension of that conclusion is that student expectations,

aspirations, reasons for attending, and goals might also be part of the

interaction between student and environment.

Statistical Elements of Previous Studies   This section is a review of

the statistical structure of previous studies. Included in this section

are a discussion of characteristics studies, a summary of the populations

used, and a review of the statistics employed in previous investigations.

Characteristics Studied   Probably the most common designs involved

selection of basic demographic characteristics and/or scores coupled with

an interview or questionnaire on the reasons for withdrawal (Barger and

Hall, 1965; Demos, 1968; Gekoski and Schwartz, 1961; Goble, 1957;

Holmes, 1959; Panos and Astin, 1968; Slocum, 1956). Others chose basic

demographics and/or scores coupled with the results of a social con-

sciousness or personality questionnaire (Barger and Hall, 1964; Blanch-

field, 1971; Lins and Pitt, 1953; Rossmann and Kirk, 1970; Vaughan, 1968;

Zaccaria and Creaser, 1971), while a questionnaire on attitudes and values

was substituted by Chase (1970), Johansson and Rossmann (1973), Marks

(1961), and Sewell and Shah (1967).

Several investigators chose to include only those items on file or

known at the time of admission. Such studies would typically include

some combination of indicators and tests selected from some of high school

rank, ACE psychological exam, first-semester grades, SES indices, occu-

pation and education of one or both parents, religion, hometown community,

source of finance, and freshman activities. Examples of such studies can

be found in Eckland (1964a), Hanson and Taylor (1970), Munger (1956),

Stone (1965), or Stork and Berger (1978). Kamens (1971) and Abel (1966)

coupled basic demographics with occupational choice, and Hackman and

Dysinger (1970) and Trent and Ruyle (1965) calculated a "commitment" or

"motivation" score based on students' and parents' perceptions of the

importance of college, highest degree planned, and pressure to attend

college. Stone and Ryan (1964) considered only study habits.

Morrisey (1971) measured a series of non-intellectual factors

(family independence, family social status, student independence, liberal-

ism, peer independence, and sex), and controlled for academic ability.

Hannah (1969) measured the withdrawal process--when students first thought

of leaving, who they talked to as they decided to leave, topics discussed, reactions of others, and feeling about one's self, and finally, Nelson (1966) considered college characteristics--cost, control, admissions policy, sex composition of the student body, faculty-student ratio, number of doctorates, and library size.

Population   The most common population studied was entering freshmen. Examples include Barger and Hall (1964), Chase (1970), Eckland (1964a, 1964b), Gekoski and Schwartz (1961), Goble (1957), Hanson and Taylor (1970), Holmes (1959), Johansson and Rossmann (1973), Lins and Pitt (1953), Little (1959), Marks (1967), Morrisey (1971), Munger (1956), Rossmann and Kirk (1970), and Stone and Ryan (1964). Investigators who restricted their population to entering freshmen but who considered multiple colleges include Hannah (1969), Hackman and Dysinger (1970), Kamens (1971), Nelson (1966), and Panos and Astin (1968). Zaccaria and Creaser (1971) restricted their study to those freshmen who had participated in a freshman guidance program. Astin (1977), Sewell and Shah (1967), and Trent and Ruyle (1965) all designed studies to involve senior high school students with a later follow-up at multiple colleges. Finally, studies where students were chosen randomly from all students on file or who had withdrawn (i.e., not exclusively freshmen) were performed by Abel (1966), Barger and Hall (1963), Blanchfield (1971), Demos (1968), and Slocum (1956).

Statistics   With respect to techniques used, Summerskill noted that we can assume multicausality in attrition. "Tabulations of reasons into neat, mutually exclusive categories . . . simply do not cope with the realities of college dropouts and are of little value" (1962, p. 649).

Others, noted in this review of the literature, appear to support the argument. However, some investigators have chosen the exclusive use of univariate statistics or simple bivariate percentages and have performed no significance testing (Demos, 1968; Eckland, 1964a; Gekoski and Schwartz, 1961; Goble, 1957; Hannah, 1969; Holmes, 1959; Johansson and Rossmann, 1973; Kamens, 1971; Lins and Pitt, 1953; Little, 1959; Trent and Ruyle, 1965). First level statistical analysis (means, standard deviations, correlations, t-scores) were performed by Able (1966), Hackman and Dysinger (1970), Marks (1961), Munger (1956), Vaughan (1968), and Zaccaria and Creaser (1971). Examples of the application of Chi-square analysis to the problem can be found in Barger and Hall (1964, 1965), Chase (1970), Hackman and Dysinger (1970), Nelson (1966), Morrisey (1971), Kowalski (197), Rossmann and Kirk (1970), Sewell and Shah (1967), Stone and Ryan (1964). Blanchfield (1971), Hanson and Taylor (1970), and Stone (1965) used discriminant analysis, and Astin (1975) and Panos and Astin (1968) used regression analysis.

In this study the multicausality of attrition suggested by Summer-skill is recognized. Factor analytic techniques are used to develop multiple categories of predictor variables, and these variables are entered into a discriminant analysis program to develop formulas for predicting attrition.

Summary of Chapter II

The attrition phenonemon has been investigated through a variety of techniques, designs, and factors. Part of the problem in finding consistent results is the lack of a consistent definition, which has varied

from one of a failure to return after one year to a failure to return after eight years. Leavers have been divided into voluntary and involuntary dropouts. In some cases, additional categories (disciplinary dismissal, GPA), have been part of the design.

Several syntheses of the literature exist. They have generally been organized around several major themes—typically some combination of demographic factors, academic factors, motivational or personal factors, social factors or factors related to adjustment to college, factors related to pre-college environment, and factors related to the college environment. In general, research and arguments both for and against the significance of any given factor can be found, although all who have developed syntheses conclude that the causes of attrition are multiple. Agreement on particular combinations of causes cannot be found, although most conclude that the combination is comprised of factors from several, if not all, of the items discussed in the major themes which dominate the syntheses.

Many divergent designs have been used to research the problem. While single institution studies dominate the literature, various approaches have attempted to incorporate aspects of material typically available in institutional data bases coupled with the results of questionnaires on personality, reasons for withdrawal, or expectations about college. Multi-institutional studies incorporate college characteristics—institutional size, type, control, location, cost. Efforts to develop a theory have centered on the relation between individual students and individual colleges—the congruency argument.

The section which reviews the results in depth is organized around

several major themes. Results pertaining to basic demographic, financial, and socio-economic factors are found to be ambiguous. Evidence in support of hypotheses that one or another, or some combination of these factors, is significantly related to attrition is essentially rejected when other studies are developed using different controls or different environments. Age does not appear to be related to attrition, although most studies have involved predominantly traditional-aged students. Sex appears not to be related, but the results are equivocal. Most SES factors seem not to be significant, especially when academic variables are controlled, although some studies report the opposite. Financial factors are not major—students generally seem able to overcome financial problems over time. Most studies continue to include some demographic factors, however, if not to prove significance, then to provide a convenient framework for reporting the results.

Academic factors are considered to be the most reliable single predictor of attrition, at least for traditional students. However, the literature suggests that too much emphasis on this single factor is not appropriate. Attrition appears to be a multicausal phenonemon. Cope and Hannah (1975) reinforce this view with the observation that the amount of variance explained by academic factors is, in the final analysis, "disappointing at best" (p. 12).

As Pantages and Creedon note, motivational factors are important and should be studied in more detail in order to gain a better understanding of the problem (1978, p. 65), although they caution that the failure to establish the relationship may actually indicate that the factor is not important after all (1978, p. 71). In this review, motivational factors

have been expanded to include student aspirations, goals, expectations about college, and reasons for attending college, and the grouping has been entitled "individual factors." Thus students who aspire to degrees beyond the baccalaureate seem to have less chance of dropping out, as do students with vocational goals and/or students with a philosophy consistent with that of the institution (congruency). College environmental factors are also important. Students with part-time employment on campus or students who have become involved with the campus life in general have better chances of persisting. Although the results to date are uncertain, individual factors, coupled with college environmental factors, seem to provide one avenue to investigate the congruency or "college fit" thesis, a thesis which has been suggested either directly or indirectly by Cope and Hannah (1975, p. 21), Summerskill (1962, p. 650), Tinto (1975, p. 291), Feldman and Newcomb (1969, p. 289), and Pantages and Creedon (1978, pp. 93-94) as an important and promising approach to the problem.

The most common research design involved selection of basic demographic characteristics coupled with investigations of reasons for leaving. Other investigators incorporated various personality, attitude, and values tests, or attempted to measure commitment or motivation.

The most common population studied was entering freshmen at single institutions. Others considered high school students with a follow-up at multiple institutions. Finally, univariate statistics and/or means, standard deviations, and chi-square analyses were the most common statistics employed to anlayze data. A few investigators used regression analysis or discriminant analysis.

In conclusion, the literature suggested several implications for this study. Background characteristics (demographic, SES, and financial) were collected and used as only part of the prediction process. Tinto's theory clearly suggests that these factors are not the major elements involved in predicting attrition, although other results suggest that one breakdown or another of these relatively simple, well-defined elements may actually be predictive. Academic information was collected and treated in a similar fashion. The other two major themes incorporated into the study have been entitled "college environmental factors" (satisfaction, use of facilities, participation in activities, and general involvement in college) and "individual factors" (reasons for attending, college choice criteria, expectations about college, and anticipated activities).

One problem is measurement. The theories generally avoid the issue of how one goes about calculating a meaningful figure to indicate one level or another of "happiness with the environment," for example, or how best to say that a student's reasons for attending are the "right quantity" to suggest persistence. In Chapter III the approach used in this study will be discussed.

CHAPTER III: METHODOLOGY

Development of the questionnaires, the pilot, and the final study
are described in this chapter. Included are descriptions of the sample
populations, validity and reliability of the instruments used, the data
reduction techniques, and the statistical analysis used in the study.

Overview of the Research

The general research procedure involved administration of a ques-
tionnaire to two samples of students. One sample was composed of stu-
dents who chose to participate in an orientation program held two weeks
prior to the beginning of classes in the fall, 1978. The other sample
was selected from previously enrolled students who were in Sophomore,
Junior, or Senior level courses during the third week of the fall, 1978
term. Freshmen courses were eliminated because of the high probability
of overlap with the orientation students. A more detailed description of
the population will follow later in the chapter.

The procedure called for determining which students did not return
to college the subsequent academic term and for use of the data developed
from the questionnaires to build a model that would discriminate between
persisters and non-persisters. Part of the rationale for gathering two
samples was the possibility that factors affecting attrition might not be
the same for both groups. One third of each sample was not included in
the model-building procedures in order that the predictive ability of the
final model could be tested. The project design also called for the
actual development of the two questionnaires, which were to be used to

collect information on student attitudes, goals, reasons for attending college, financial factors, and expectations about college.

Instrumentation

An original questionnaire, based on a review of the literature, was presented to a committee consisting of two members of the sociology department (white male, black female), a representative of the counselling center (black female), and the author (white male, Director of Institutional Research). Questionnaires designed to collect data relevant to the factors used in this study can also be found in Astin (1975, pp. 186-194), Kowalski (1977, pp. 102-106), Bower and Myers (1976, pp. 51-56), Uhl (1977), and Educational Testing Service (1974). None of these questionnaires contain all the items utilized in this study.

The committee reviewed the questionnaire in October of 1977, and a revised (rephrased and restructured) version was presented to a larger committee in November 1, 1977. The larger committee had representation from the offices of Student Services, Placement, Financial Aid, the Basic Studies Department, Admissions, Continuing Education, the Registrar, the Counselling Center, and the Academic Dean. Several small revisions were made (additions, deletions, and rephrasing). The purpose of this committee was to determine whether there were elements unique to the college population being studied that should have been included in the questionnaires.

In December, 1977, about twenty students were asked to complete the questionnaire with the particular charge of noting lack of clarity, ambiguity, offensive areas (sex or race discrimination), and for deter-

mining time and ease of completion. A slightly revised (additional adjectives) version was pilot tested (180 students) during February, 1978. The sample population for the pilot test was similar to the sample for the final study. Classes from various disciplines (natural and quantitative sciences, liberal arts, social sciences, and education) were selected, and the questionnaire was administered in class. Since the questionnaire was long—it took about thirty minutes to complete—and because of all of the problems inherent in mailing questionnaires to students, the "captive audience" approach was selected. Reliability results will be presented in the section on validity and reliability.

The Final Questionnaires   The decision was made to develop two questionnaires because the single version did not apply directly to either the orientation students or to the continuing students. Orientation students anticipate college (future tense) and cannot report on their satisfaction with academic activities or administrative services. Continuing students can report on their satisfaction and deal with such things as activities while at college in the present or past tense. The questionnaire for new students is identical to the questionnaire for continuing students with two exceptions: the tense used in the items and the additional sections on satisfaction with academic life, administrative services, and involvement with college life.

Both questionnaires contain the following nine sections:

Demographic Data	28 items
Use of Facilities	7 items
Participation in Activities	6 items
Potential Problems	43 items

Anticipated Activities	34 items
Reasons for Attending/Goals	21 items
College Choice Criteria	8 items
Financial Support	7 items
Subtotal	154 items

and continuing students also answered:

Academic Life Satisfaction	21 items
Administrative Satisfaction	16 items
Involvement in College	16 items
Grand total	207 items

These categories emerge from the review of the literature in the following fashion: demographic and financial support relate to the age, sex, socioeconomic, financial, and academic literature; use of facilities, participation in activities, academic life satisfaction, administrative services satisfaction, and involvement in college relate to the college environment literature, and potential problems, anticipated activities, reasons for attending, and college choice criteria relate to the literature on individual factors.

Validity and Reliability   The items in the questionnaires involved areas suggested by the literature as potential factors in predicting attrition, and the items were developed as a result of a review of the literature and examination of other questionnaires. In addition, the questionnaires went through several reviews designed to insure that any factors uniquely related to the particular college being studied would also be included. The questionnaires were tested for clarity, ease of use, and threatening or offensive items. A cover letter on each ques-

tionnaire guaranteed confidentiality--no individual results would be revealed, and the results were to be for research purposes only.

Reliability was established by analyzing the results of the pilot study using the split-half method. A coefficient of .92 was established.

Population

As outlined earlier, the population for this study was comprised of two groups of students. The first group consisted of students who chose to attend an orientation program for new students held two weeks before classes began. Completion of the questionnaire was voluntary, and 278 of the approximately 400 students in attendance (69%) completed the questionnaire.

Self-selection for this group may have been a problem in two ways. First, attendance at the orientation program was voluntary; second, students at the program were given the questionnaire and asked to return it sometime during the day. Furthermore, the usual social and/or emotional factors which attend an event such as college orientation may have served to make the environment artificial.

The second group included all students in class at 10:00 a.m., Monday, Wednesday, or Friday the third week of the fall semester, 1978, and every student in the 7:00 p.m. class Tuesday or Wednesday evening of the same week. Completion of the questionnaire was again voluntary and 1036 of the approximately 1100 students given the questionnaire (94%) chose to complete the instrument. One hundred and fifty-four of the responses were eliminated because several of the faculty members failed to administer the questionnaire during the third week. No single depart-

ment or discipline was totally unrepresented. Duplications resulting
from some students being at more than one administration of the question-
naire were eliminated by a computer program which was written to identify
and delete records with duplicate social security numbers. This second
population represented a random sample of the continuing students at the
college.

Procedures

Faculty administered the questionnaire to classes of continuing stu-
dents. A statement, indicating the importance and the nature of the pro-
ject and signed by the Academic Dean, was given to each instructor involved.
Participation of the students was voluntary. A statement, indicating the
importance and the nature of the project and including a guarantee of con-
fidentiality was given to each student along with the questionnaire. For
new students, the statement of confidentiality and the importance and
nature of the project was presented orally at orientation. A member of
the staff from the Office of Institutional Research administered the ques-
tionnaire to the orientation group.

Dropouts were determined as those students who did not register dur-
ing the spring semester, 1979. Two-thirds of the results from each sample
was used to develop prediction formulas (separate formulas for each group),
and one third of the results from each sample was held back to test the
validity of the formulas. Selection was random—every third name on a
numerically sequenced list was held as the "control" group.

Statistical Analysis

It should be noted that all discussion of two groups of students

(orientation and continuing) refers to the two subsets consisting of two-thirds of each group.

Basic Descriptive Statistics   A frequency count of all of the items on the questionnaire along with minimum and maximum values, means, standard deviations, ranges, and sample sizes were calculated. These data are incorporated into the main text of the analysis only where they contribute to the research or provide relevant background.

Criterion Variable   There was only one criterion variable—either a student returned to college the next academic term or did not.

Predictor Variables   As noted elsewhere, Tinto's model is theoretical, and the practical problem of measurement of the factors that he considered important to the model is not addressed. In this study the issue was addressed through the use of factor analytic techniques, which were used to develop the predictor variables.

The first step in the process was to reduce the items in the non-demographic sections of the questionnaires to a more manageable number. The principal factors method (SPSS program FACTOR) was used, and orthoganality was maintained. A total of thirty-five factors was found for orientation students and a total of forty-one factors for continuing students. Insignificant factors were not discarded in an effort to maintain as much variance as possible for subsequent analysis. Therefore, thirty-five factor scores were calculated for each orientation student and forty-one such scores for each continuing student. The factor scores were calculated by using the SPSS option FACSCORES in the SPSS FACTOR program. The factor scores were written to a separate data set and the ADD VARIABLES command was used to add these scores to the data bases as

additional variables. For identification purposes, these variables have been termed "first-level factor scores." The first-level factor scores for orientation students are identified in Table 3.1 and the first-level factors for continuing students are identified in Table 3.2. Appendices I and II contain a list of the first-level factors for orientation and continuing students respectively, and the most significant questions which comprise each factor.

The information in Tables 3.1 and 3.2 represents the foundation for the factor analytic portion of this study. Each non-demographic section of each questionnaire was factor analyzed separately, and the results of these analyses, and thus the underlying factors of the different sections, are contained in these two tables. For example, the twenty-one questions in the Reasons For Attending section were reduced to seven factors for orientation students and five factors for continuing students.

The factors in the different sections are somewhat parallel for orientation and for continuing students, although some differences do occur. The factor "Advance in present job," for example, ranks fourth as a reason for attending for orientation students, and accounts for 8.4 percent of the variance in the sequence of twenty-one questions on Reasons for Attending/Goals. The same factor also appears for continuing students. In this case, "Advance in present job" ranks third and accounts for 13.1 percent of the variance. Finally, the questions which support the factors listed in Tables 3.1 and 3.2 have some differences between continuing and orientation students. Inspection of Appendices I and II will show that the individual lists of items under the "Advance in present job" factors, although similar for both groups, contain differences and, further, that

FIRST-LEVEL FACTORS FOR
ORIENTATION STUDENTS

SECTION	NUMBER OF QUESTIONS	FACTORS	EIGEN-VALUES	% OF VARIANCE
Anticipated Activity in College	34	Drop or stop out, negative feeling	5.0	25.2
		Become academically involved	3.2	16.4
		Become involved in athletics	2.4	12.0
		Become involved in cultural areas	1.8	8.7
		Have procedural problems	1.8	8.6
		Challenge course/take GRE	1.3	6.3
		Become socially involved	1.1	5.5
		Have academic success	1.0	4.8
		Drop or stop out, positive feeling	0.7	3.4
		"Private" social involvement	0.6	3.1
		College—yes, but not #1	0.6	3.0
		Divorce concerns	0.6	2.9
Potential Problems	43	Discrimination concerns, all kinds	13.4	51.4
		Don't like college	3.4	13.1
		Financial concerns	2.1	8.0
		Uncertain about desirability	1.7	6.5
		Academic concerns	1.3	5.0
		Child care problems	1.1	4.1
		Need a job	1.0	3.6
		Don't fit into environment	0.9	3.2
Reasons for Attending/ Goals	21	General self improvement	5.6	49.4
		Academic curiosity	1.7	15.1
		Become involved in activities	1.1	10.1
		Advance in present job	0.9	8.4
		Default action	0.8	6.7
		Change careers	0.6	5.3
		Get ready for graduate school	0.6	4.9
Use of Facilities	7	Use activity areas	1.9	64.9
		Use academic areas	1.0	35.1
Activities	6	General participation in activities		100.0
Choice Criteria	8	Scheduling and choice of courses	2.1	54.8
		Influence of family or friends	1.0	24.4
		Cost and location	0.8	20.8

TABLE 3.1

FIRST-LEVEL FACTORS FOR
CONTINUING STUDENTS

SECTION	NUMBER OF QUESTIONS	FACTORS	EIGEN-VALUES	% OF VARIANCE
Anticipated Activity in College	34	Become involved in athletics	5.4	31.3
		Become involved in cultural areas	2.5	14.4
		Become academically involved	1.9	11.0
		Have procedural problems	1.6	9.1
		Dropout or Stopout	1.2	7.1
		Excell academically	1.0	5.8
		Become socially involved	0.8	4.8
Potential Problems	43	Discrimination concerns, all kinds	11.5	49.6
		Don't like college	2.7	11.8
		Financial concerns	2.1	9.2
		Academic concerns	1.5	6.4
		College conflict with personal life	1.3	5.5
		Don't fit into environment	1.1	4.8
Reasons for Attending/ Goals	21	Academic curiosity	5.3	53.2
		Become involved in activities	1.8	17.7
		Advance in present job	1.3	13.1
		Change careers	0.8	8.4
Administrative Satisfaction	21	Child care/health/food service	6.9	63.4
		Dean's services	1.6	14.6
		Counseling services	1.4	12.7
		Admissions/registrar/business	1.0	9.1
Academic Satisfaction	16	Frequency and scheduling of courses	6.4	64.3
		Accessibility, helpfulness-instrs.	1.9	18.7
		Type and variety of courses	1.0	10.2
		Quality of instruction	0.7	6.8
Activities	6	Athletics and special activities	1.8	79.6
		Academic and social activities	0.5	20.4
Use of facilities	7	General use of all facilities		100.0
Choice Criteria	8	Scheduling, flexibility of courses	1.7	54.4
		Influence of family and friends	0.9	29.9
		Cost and location	0.5	15.7

TABLE 3.2

the individual loadings for given questions are not identical for both groups.

The means and standard deviations of each of the 109 variables for orientation students and 146 variables for continuing students were calculated and stored in a data set for later use by the prediction model. The SPSS program FACTOR was used to calculate factor score coefficients for each of the first-level factor scores, and the coefficients were written to separate data sets for later use by the prediction model. There was one coefficient for each factor for each variable. Thus, there were 3,815 coefficients for orientation students (35 coefficients for each of the 109 variables) and 5,986 coefficients for continuing students (41 coefficients for each of the 146 variables.)

The next step in the data reduction (development of predictor variables) was more heuristic. The principal factors method was used (SPSS program FACTOR), and orthogonal rotation was again maintained. Again, data for orientation and continuing students were analyzed separately. The first-level factor scores developed in the previous step were entered into the FACTOR program, and various methods and rotations were tested.

The detailed procedures for this step were identical to the procedures in the development of the first-level factor variables. A total of sixteen second-level factors was found for orientation students, and a total of seventeen factors was found for continuing students. Therefore, sixteen factor scores were calculated for each orientation student, and seventeen factor scores were calculated for each continuing student. These factor scores were added to the data bases as additional variables. For identification purposes, these variables have been termed "second-

level factor scores." The second-level factors for orientation students are identified in Table 3.3 and the second-level factors for continuing students are identified in Table 3.4.

The data in Table 3.3 and Table 3.4 is the final set of factors which underlie the two sets of questionnaires. The 109 original items for orientation students have been reduced, in two steps, to the sixteen items in Table 3.3, and the 146 original items for continuing students have been reduced to the seventeen items in Table 3.4. Each of the factor descriptions in Tables 3.3 and 3.4 consist of the most significant contributors from the first-level factor scores. The factors in Table 3.3 evolved from the factor scores of the factors in Table 3.1 and the factors in Table 3.4 from the factors in Table 3.2. For example, in Table 3.3 the factor described as "Personal involvement/General participator/Has academic concerns" is a combination of several first-level factors, and represents a consistent pattern of responses to the questions which actually make up the individual first-level factors. It is a "mini-description" of one of the sixteen factors which evolved for the orientation students.

Using a method identical to that for the previous step, means and standard deviations of the first-level factor scores were calculated and stored on a data set for later use by the prediction model. There were thirty-five means and standard deviations for orientation students and forty-one means and standard deviations for continuing students. Factor score coefficients were also calculated and stored on separate data sets for later use by the prediction model. There were 560 coefficients for orientation students and 697 for continuing students.

SECOND-LEVEL FACTORS FOR
ORIENTATION STUDENTS

EIGEN-VALUE	% OF VARIANCE	FACTOR IDENTIFICATION
2.5	14.3	Expects to leave college/Doesn't like college
1.9	10.8	College not top priority/but plans some involvement
1.6	9.3	Plans involvement in athletics and activity areas
1.4	8.2	"Personal" involvement/general participator/has academic concerns
1.3	7.2	Has financial concerns/here because of cost & location
1.2	6.9	Expects procedural problems
1.1	6.3	Expects to become socially involved/here because of scheduling & choice of courses; to advance in job
1.0	5.9	Expects procedural problems/here because of influence of family and friends; to get ready for grad. school
0.9	5.2	Here to advance in job, not sure college is the way/ will not be academically involved
0.9	5.0	Expect academic success/has child care concerns
0.8	4.3	Expects academic involvement/here to get ready for grad. school, academic curiosity/family influence
0.7	4.0	Divorce concerns/here for general self improvement/ chose because of flexibility & schedule of classes
0.6	3.3	Drop or stop - positive feeling/general participator but uncertain about desirability of attending
0.6	3.0	Expects to become involved in cultural areas/grad. school preparation
0.5	3.0	Discrimination concerns

TABLE 3.3

SECOND-LEVEL FACTOR FOR
CONTINUING STUDENTS

EIGEN-VALUE	% OF VARIANCE	FACTOR IDENTIFICATION
3.4	18.6	Spent time with academic advisor/Knew names of some of dean, president, SGA president
2.4	13.1	Goes to athletic and sports events/General user of facilities/involvement
1.6	8.7	Satisfaction with counseling services—all kinds
1.5	8.3	Social involvement/Attendance at academic and social activities
1.1	6.1	Chose because of cost and location/chose because of family and friends/Scheduling good/Has financial concerns/Came to change careers
1.1	6.0	Dissatisfaction with type and variety of courses
1.0	5.6	Satisfaction with frequency/scheduling of courses
0.9	5.0	Satisfaction with deans' services
0.8	4.5	Expects to drop out or stop out
0.7	4.0	Has academic concerns
0.7	3.8	Satisfied with accessibility and helpfulness of instructors, outside of class
0.6	3.5	Satisfied with Admissions/Registrar/Business Offices
0.6	3.3	Here to advance in job/College conflicts with rest
0.4	2.2	Expects to be or is academically involved
0.4	2.0	Expects to excell academically/Here to change careers

TABLE 3.4

<u>Discriminant Analysis</u>   Since the final prediction required by the pre-
dictor variables is one of two possible outcomes (return or dropout),
discriminant analysis was selected for the final step in the analysis of
the data.   Several discriminant analyses were performed.   The twenty-eight
demographic characteristics, the seven methods of financial support, the
thirty-five second-level factor scores for orientation students or the
forty-one second-level factor scores for continuing students were included
in the discriminant analysis.   Both direct and stepwise methods were
attempted and both the full set of variables and several versions of sub-
sets of the variables were entered into the analyses.   Each analysis
yielded a different, though similar, set of discriminant coefficients.

Thus several sets of discriminant coefficients for the orientation
students and several other sets for the continuing students were derived.
Actual running of the model involves selecting a set of discriminant
coefficients and submitting it, along with other parameters to be described
in the next chapter, to the prediction model for processing.

Hypothesis

The hypothesis has three specific parts.   For the college being used
in this study:

1. The basic congruency model proposed by Tinto is appropriate
    for the college being studied.   While motivational and expec-
    tational factors are important in predicting attrition,
    background variables are at least equally important.

2. Attrition is a multi-faceted phenomenon.   No single variable
    or factor will emerge as the only predictor of attrition or

retention.

3. Factors and variables which most significantly predict
   attrition are not the same for traditional as for non-tradi-
   tional students. Thus congruency is defined by different
   variables for various subgroups of the population.

Summary of Methodology

Questionnaires to collect information on student attitudes, goals,
expectations about college, reasons for attending college, means of finan-
cial support, and demographic data were designed and pilot tested. Reli-
ability and validity of the instruments were established.

Two groups of students were identified--orientation students and
continuing students, and separate questionnaires were administered to
each group. A total of 1314 students responded.

For each group the questions in the questionnaire were logically
divided into subsets. Each subset was factor analyzed, and factor scores
for each resulting factor were calculated for each student. The resulting
factor scores were factor analyzed, and factor scores for each resulting
factor were again calculated for each student. For each group, these
final factor scores were combined with demographic and financial support
data and entered into various discriminant analyses to develop discrimi-
nant coefficients. Each analysis yielded a separate set of coefficients.
The discriminant coefficients became part of the basic data entered into
a model to predict student attrition.

CHAPTER IV: ANALYSIS OF RESULTS

A model for predicting attrition and an analysis of the results as
they relate to the hypothesis are contained in this chapter.

The Model

A model was developed to predict which students would or would not
persist in college. The model was implemented on a computer using the
FORTRAN language. The program is presented in Appendix III.

The user of the model normally selects the variables to be used in
the prediction formula from the set of twenty-eight demographic charac-
teristics, the seven means of financial support, and the sixteen or seven-
teen second-level factor scores. To select the variables, the user should
be guided by the results of a discriminant analysis because coefficients
for the prediction formulas are normally generated by a discriminant
analysis. However, the user is free to develop coefficients from an algo-
rithm of another choice. In addition, the user is not restricted to the
variables suggested above. Any of the variables in the questionnaires, or
any of the variables developed along the way, could be identified and
entered into the model.

Variables are selected by a user of the model by indicating a
sequence of indices corresponding to the demographic, financial, and
second-level factor score variables. The corresponding prediction coef-
ficients (normally discriminant coefficients) are listed in a sequence
that corresponds to the indices. The user must supply one set of coef-
ficients for calculating an attrition score and one set for calculating

a persistence score. The largest of the two scores represents the category finally predicted by the model.

The formulas may be weighted, thus instructing the model to err in either direction (persistence versus attrition). Weights typically range from minus 5 to plus 5 in increments of one, although any sequence of weights may be selected. The weights are simply an arithmetic constant which is added to the attrition score finally calculated by the model.

This technique actually changes the overall accuracy of the results as a function of the weights assigned by the user. The change may be either positive or negative. More importantly, the weights will predictably increase the number of non-persisters correctly identified by the model. The cost of increasing the number of correctly identified non-persisters is a decrease in the number of correctly identified persisters, and the benefit of decreasing the number of correctly identified non-persisters is an increase in the number of correctly identified persisters. Thus, through several iterations of the model, the user can attempt to match the mix of correctly identified non-persisters with the resources available to deal with the problem. The algorithm for the model essentially follows the logic of the two level analysis process described in the "Predictor Variables" section of the previous chapter. First-level factor score coefficients and standardized raw scores are used to build first-level variables corresponding to the first-level factor scores, and second-level factor score coefficients and standardized first-level factor scores are used to build second-level variables corresponding to the second-level factor scores.

More precisely, if

B_{ijk} = A first-level factor score coefficient for the kth factor, j^{th} score, set i.

X_{ij} = Mean of the jth first-level factor score in set i.

F_m = One of the m first-level factor scores. There are 35 factor scores for orientation students and 41 for continuing students.

C_{kn} = A second-level factor score coefficient for the nth factor and the kth first-level factor score.

Y_k = Mean of the kth first-level factor score.

E_k = Standard deviation of the kth first-level factor score.

G_ℓ = the ℓth second-level factor score. There are 16 second-level factor scores for orientation students and 17 for continuing students.

D_{ij} = Standard deviations of the jth first-level factor score in set i.

S_{ij} = Raw score for the jth question in set i for a given student.

Then for a given student selected from the set of students with parameters (age, orientation or continuing) identical to a set used to develop discriminant coefficients A and P, a first-level factor score, F_m is calculated as:

$$F_m = \sum_{i+1}^{p} \sum_{K=1}^{q} \sum_{j=1}^{r} B_{ijk} \times (S_{ij} - X_{ij}) / D_{ij} \;.$$

where:

p = 6 for orientation students

8 for continuing students

q = number of first-level factors in set p

r = number of questions in set p

m = 1,h

and h = 35 for orientation students

41 for continuing students

and a second-level factor score G_ℓ is calculated as:

$$G_\ell = \sum_{m=1}^{h} \sum_{k=1}^{p} C_{ij} \times (F_m - Y_m) / E_m \;.$$

where:

h = as defined above

d = 16 for orientation students

17 for continuing students

and ℓ = 1,d .

The actual prediction process is less complex. If:

M_i = The ith variable to be used in the prediction

formula

A_i = The ith discriminant coefficient for an

attrition equation

P_i = The ith discriminant coefficient for a

persistence equation

np = The number of variables to be used in a given

simulation.

Then calculate:

$$SUM1 = \sum_{i=1}^{np} M_i \times A_i$$

$$SUM2 = \sum_{i=1}^{np} M_i \times P_i .$$

Without weighting, the prediction algorithm is to predict attrition if SUM2 is greater than SUM1; otherwise predict persistence.

The user can enter up to nineteen weights, a limitation of the model which almost certainly exceeds normal use. In the examples in this study five weights were used.

The model will prepare one complete analysis for each weight selected. Thus, up to nineteen analyses will be performed and up to nineteen tables will be generated. For each weight, the algorithm is to predict attrition if SUM2 plus the ith weight is greater than SUM1; otherwise predict persistence.

Results

Three discriminant analyses were performed in order to present the capabilities of the model and to develop a response to the second part of the hypothesis. Separate analyses were performed for continuing students, ages 17-21, for continuing students, ages 22-45, and for orientation students, ages 17-21. Insufficient sample size prevented performing

a discriminant analysis on orientation students, ages 22-45. Therefore the prediction model was not run for this group.

Classification Results   The results of three simulations are presented in Tables 4.1 through 4.3. A range of five weights for each execution was supplied to the model. The results are further segmented into "base data" and "live data." Base data consists of the two-thirds subset of the original samples used to build the model, and live data consists of the remaining one-third of the samples used to test the accuracy of the model. The tables contain the proportion of correctly predicted actions and the actual number of correctly classified students in each case. Finally, the accuracy anticipated by the discriminant analyses is reported and compared against the accuracy reported by the model.

Table 4.1 contains the results of a simulation for continuing students, ages 17-21. For a given weight, the paired values in the table represent the proportion of correctly predicted actions and the number of correctly classified students. Five weights were selected for this particular run of the model, from minus four to plus four. A weight of zero depicts direct application of the discriminant coefficients with no attempt to "artificially" identify more (or less) non-persisting students. Thus, with the particular subset of variables used for this set of predictions, the accuracy of prediction for returning students ranged from 88 percent to 71 percent for base data and from 88 percent to 70 percent for live data. The accuracy for non-returning students ranged from 27 percent to 41 percent for base data and from 24 percent to 41 percent for live data.

A summary of the discriminant analysis used to generate the

PROPORTION OF CORRECTLY PREDICTED ACTIONS
ORIENTATION STUDENTS   AGES 17-21

WEIGHT		BASE DATA						LIVE DATA				
		-4	-2	0	2	4		-4	-2	0	2	4
ACTION	N						N					
RETURN		.88	.85	.81	.78	.71	136	.88	.84	.81	.78	.70
N	181	160	153	147	141	128	136	120	114	110	106	95
NOT-RETURN		.27	.32	.32	.36	.41		.24	.29	.29	.35	.41
N	22	6	7	7	8	9	17	4	5	5	6	7
TOTAL		.82	.79	.76	.73	.67		.81	.78	.75	.73	.67
N	203	166	160	154	149	137	153	124	119	115	112	102

SUPPORTING DISCRIMINANT ANALYSIS

WILKS' LAMBDA: 0.44   CORRECTLY CLASSIFIED--
RETURN CENTROID: 0.45   RETURN: 85%
NON-RETURN CENTROID: -2.77   NON-RETURN: 65%
CANNONICAL CORRELATION: 0.75   TOTAL: 83%
CHI-SQUARED/D.F.:   54.9/20
SIGNIFICANCE: 0.0000   TWENTY VARIABLES SUGGESTED

TABLE 4.1

PROPORTION OF CORRECTLY PREDICTED ACTIONS
CONTINUING STUDENTS   AGES 17-21

WEIGHT		BASE DATA						LIVE DATA				
		-2	-1	0	1	2		-2	-1	0	1	2
ACTION	N						N					
RETURN		.97	.97	.97	.96	.96		.97	.97	.97	.96	.96
N	227	221	220	220	219	218	156	152	151	151	150	150
NOT-RETURN		.22	.22	.22	.27	.30		.21	.21	.21	.29	.29
N	40		9	9	11	12	28	6	6	6	8	8
TOTAL		.86	.86	.86	.86	.86		.86	.85	.85	.86	.86
N	267	230	229	229	230	230	184	158	157	157	158	158

SUPPORTING DISCRIMINANT ANALYSIS

WILKS' LAMBDA: 0.28   CORRECTLY CLASSIFIED--
RETURN CENTROID: 0.68   RETURN: 90%
NON-RETURN CENTROID: -3.65   NON-RETURN: 75%
CANNONICAL CORRELATION: 0.85   TOTAL: 88%
CHI-SQUARED/D.F.:   128/22
SIGNIFICANCE: 0.0000   TWENTY-TWO VARIABLES

TABLE 4.2

PROPORTION OF CORRECTLY PREDICTED ACTIONS
CONTINUING STUDENTS   AGES 22-45

		BASE DATA						LIVE DATA				
WEIGHT		-2	-1	0	1	2		-2	-1	0	1	2
ACTION	N						N					
RETURN		.92	.85	.80	.76	.70		.94	.87	.81	.77	.71
N	344	316	292	274	260	241	238	224	207	192	183	170
NOT-RETURN		.28	.46	.57	.67	.74		.32	.46	.61	.71	.76
N	123	35	56	70	83	91	79	25	36	48	56	60
TOTAL		.85	.75	.74	.73	.71		.79	.77	.76	.75	.73
N	467	292	348	344	343	332	317	249	243	240	239	230

SUPPORTING DISCRIMINANT ANALYSIS

WILKS' LAMBDA: 0.67   CORRECTLY CLASSIFIED--
RETURN CENTROID: 0.40   RETURN: 74%
NON-RETURN CENTROID: -1.23   NON-RETURN: 77%
CANNONICAL CORRELATION: 0.58   TOTAL: 75%
CHI-SQUARED/D.F.:   87.6/18
SIGNIFICANCE: 0.0000   EIGHTEEN VARIABLES

TABLE 4.3

coefficients for this particular execution of the model is also given

in Table 4.1. Wilks' lambda, a measure of the strength of the particular

discriminant analysis selected for this execution of the model, is 0.44.

The cannonical correlation, another measure of the discriminant function's

ability to discriminate between the two groups is 0.75. (The cannonical

correlation squared is the proportion of the variance in the discriminant

function explained by the two groups.) The Chi-squared statistic describes

the probability of a lambda of 0.44 or smaller occurring by chance. The

discriminant analysis suggested twenty variables as significant predictors.

Both the discriminant analysis and the execution of the model were restric-

ted to ages 22-45. The discriminant analysis was permitted to enter the

classification phase, and eighty-three precent of the students used to

develop the coefficients were actually classified correctly by the dis-

criminant procedure. This compares with the model's accuracy of 76 per-

cent for base data and 75 percent for live data. In general, the "cor-

rectly classified" figures can be compared with the "zero weight" columns

in each table to determine the relationship beweeen the correctness of

the discriminant analysis and the correctness of the model. Tables 4.2

and 4.3, which contain the results for continuing students ages 22-45

and for orientation students, ages 17-21, are interpreted in like fashion.

Table 4.4 contains the results of six typical efforts at classifying

returning and non-returning students. The purpose of this table is to

present the flexibility of the model and to show the range of accuracy

achieved from various executions of the model. Neither the "best cases"

nor the "worst cases" are included in the table. "Live data" with zero

weights were used in every execution of the model. The pattern of

PROPORTION OF CORRECTLY PREDICTED ACTIONS
ZERO WEIGHTS--LIVE DATA

| | ORIENT. | | ORIENT. | | CONTNG. | | CONTNG. | | CONTNG. | | CONTNG. | |
	A	Z	A	Z	B	W	B	W	A	Z	A	Z
RETURN	.90	.57	.79	.53	.97	.80	.92	.81	.87	.65	.54	.23
NOT-RETURN	.29	.50	.41	.67	.21	.49	.25	.61	.46	.80	.50	.67
TOTAL	.83	.56	.75	.55	.85	.73	.82	.76	.81	.69	.53	.35

This table represents the zero weight results of selecting six separate sets of discriminant coefficients and the corresponding six separate executions of the model. The column labels are:

A: AGES 1-21   Z: AGES 22-99
B: AGES 17-21   W: AGES 22-45

TABLE 4.4

accuracy resulting from application of weights would be similar to the pattern in Table 4.1 through Table 4.3. Each of the different pairs of columns represents the accuracy resulting from a different set of discriminant coefficients and corresponding demographic, financial support, and level-two factor variables.

The figures in Table 4.4 represent prediction accuracy for six given groups, each with their own set of predictor variables. The figure 0.67 under the non-returning, orientation students, for example, means that 67 percent of the students who did not return to college were correctly identified as such. To continue the description of Table 4.4, typical percentages of accuracy for non-returning students ranged from approximately twenty-five percent to forty-five percent for students under age twenty-two and from forty-five percent to seventy percent for students over age twenty-one. For continuing students, one execution of the model yielded forty-six percent accuracy for the under twenty-two non-returning group and eighty percent for the over twenty-one non-returning group. For orientation students, one execution was forty-one and sixty-seven percent respectively. The trade-off between the correctly classified non-returning students and incorrectly classified returning students is apparent. For example, to reach the figure of eighty percent accuracy for over twenty-one, non-returning students, the model incorrectly classified thirty-five percent of the over twenty-one, returning students.

Discriminant Analysis Results

The predictor variables suggested by the three discriminant analyses used to develop Table 4.1 through 4.3 are presented in Tables 4.5 through

4.7. In each case the tables are divided into three sections. For example, Table 4.5b contains predictor variables developed from the second-level factor scores, and Table 4.5c contains financial support variables. Thus, Table 4.5 indicates which twenty-two variables entered the model to produce the results in Table 4.1. Table 4.6 and Table 4.7 are presented in an identical fashion.

The values in the tables are standardized discriminant coefficients, and the signs connote the direction of the prediction. Positive signs predict persistence; negative predict non-persistence; a blank entry indicates that the discriminant analysis did not suggest the variable as significant. When considering the signs, the reader should be aware that they are in part a function of the actual coding of the variables. The strength of the predictor variables should not be compared across groups.

The signs in the tables indicate the direction of the prediction. It was previously noted that two scores (a return score and a non-return score) were calculated for each student and that the larger of the two became the value upon which the prediction was based. If the sign of a standardized discriminant coefficient is negative, then more points are added to the attrition score than to the retention score for a given response. A positive sign indicated the opposite. The relative absolute value of the coefficients indicates the relative strength of the variables within the formulas. Larger absolute values for a variable mean that the variable makes corresponding larger contributions to the score indicated by the direction of the sign.

STANDARDIZED DISCRIMINANT COEFFICIENTS
ORIENTATION STUDENTS AGES 17-21

VARIABLE	VALUE
d02: Age	
d03: Sex	
d04: Race	0.40
d05: Marital status	
d06: Number of children	
d07: Number of pre-school children	
d08: Military status	
d09: Marital status changed since college?	0.45
d10: Highest degree sought?	0.58
d11: Classification:	
d12: Number of hours currently enrolled	
d13: Number of hours completed in college	
d14: Major	
d15: Year first attended this college	
d16: Year first attended any college	
d17: Approximate G.P.A.	
d18: Approximate high school average	
d19: Who does the student live with?	-0.33
d20: Who in the family has attended college	-0.24
d21: Income of parents when student left H.S.	
d22: Number of paid jobs:	0.52
d23: Employed by this college?	-0.22
d24: Ever in work study?	
d25: Hours worked per week?	0.49
d26: Income earned per month?	-1.07
d27: Percent of college paid by student	
d28: Number of other colleges applied to?	

TABLE 4.5A -- Demographic Characteristics

STANDARDIZED DISCRIMINANT COEFFICIENTS
ORIENTATION STUDENTS AGES 17-21

VARIABLE	VALUE
Expects to leave college/Doesn't like college	
College not top priority/Plans some involvement	
Plans involvement in athletics/Use of general activity areas	-0.20
"Personal involvement" in college/general participator/has academic concerns	
Has financial concerns/Here because of cost and location	-0.62
Expects procedural problems	0.30
Expects to become socially involved/Here because of scheduling and choice of courses/Here to advance in job	
Expects procedural problems/Here because of influence of family/Here to get ready for grad. school	
Here to advance in present job/Uncertain about desirability of attending college	
Expects academic success/Child care a problem	
Expects academic involvement/Chose because of family and friends/Here to get ready for grad. school/Curiosity	0.65
Divorce oriented concerns/Here for general improvement	0.38
Dropout or stopout--positive feeling/General participator/ Uncertain about desirability of attending college	
Expects to become involved in cultural affairs/Here to get ready for grad. school	-0.77
Discrimination concerns--all kinds	

TABLE 4.5B -- Second-level Factors

STANDARDIZED DISCRIMINANT COEFFICIENTS
ORIENTATION STUDENTS AGES 17-21

VARIABLE	VALUE
Present income	
Savings	
Parents	-0.55
Spouse's income	
Repayable loans	-0.51
Scholarships, grants, gifts	-0.48
G.I. Bill	-0.41

TABLE 4.5C -- Importance of Types of Financial Support

STANDARDIZED DISCRIMINANT COEFFICIENTS
CONTINUING STUDENTS AGES 17-21

VARIABLE	VALUE
d02: Age	
d03: Sex	
d04: Race	
d05: Marital status	
d06: Number of children	
d07: Number of pre-school children	
d08: Military status	
d09: Marital status changed since college?	
d10: Highest degree sought?	
d11: Classification:	0.55
d12: Number of hours currently enrolled	0.32
d13: Number of hours completed in college	
d14: Major	
d15: Year first attended this college	
d16: Year first attended any college	
d17: Approximate G.P.A.	0.31
d18: Approximate high school average	
d19: Who does the student live with	
d20: Who in the family has attended college	-0.29
d21: Income of parents when student left H.S.	-0.28
d22: Number of paid jobs:	-0.22
d23: Employed by this college?	
d24: Ever in work study?	0.21
d25: Hours worked per week?	-1.09
d26: Income earned per month?	1.05
d27: Percent of college paid by student	-0.47
d28: Number of other colleges applied to?	

TABLE 4.6A -- Demographic Characteristics

STANDARDIZED DISCRIMINANT COEFFICIENTS
CONTINUING STUDENTS AGES 17-21

VARIABLE	VALUE
Spent time with academic advisor/Knew names of some of dean, president, SGA president	
Goes to athletic and sports events/General user of facilities/involvement	-0.26
Satisfaction with counseling services--all kinds	
Social involvement/Attendance at academic and social activities	
Chose because of cost and location/chose because of family and friends/Scheduling good/Has financial concerns/Came to change careers	
Dissatisfaction with type and variety of courses	
Satisfaction with frequency and scheduling of courses	
Satisfaction with deans' services	0.76
Expects to drop out or stop out	0.22
Has academic concerns	
Satisfied with accessibility and helpfulness of instructors, outside of class	0.35
Satisfied with Admissions/Registrar/Business Offices	
Here to advance in job/College conflicts with personal life	
Expects to be or is academically involved[1]	0.39
Expects to excell academically/Here to change careers	

TABLE 4.6B -- Second-level Factors

STANDARDIZED DISCRIMINANT COEFFICIENTS
CONTINUING STUDENTS AGES 17-21

VARIABLE	VALUE
Present income	-0.35
Savings	0.60
Parents	-0.27
Spouse's income	-0.41
Repayable loans	
Scholarships, grants, gifts	-0.56
G.I. Bill	-0.29

TABLE 4.6C -- Importance of Types of Financial Support

STANDARDIZED DISCRIMINANT COEFFICIENTS
CONTINUING STUDENTS AGES 22-45

VARIABLE		VALUE
d02:	Age	
d03:	Sex	
d04:	Race	0.20
d05:	Marital status	
d06:	Number of children	-0.48
d07:	Number of pre-school children	
d08:	Military status	
d09:	Marital status changed since college?	
d10:	Highest degree sought?	
d11:	Classification:	0.46
d12:	Number of hours currently enrolled	0.57
d13:	Number of hours completed in college	
d14:	Major	
d15:	Year first attended this college	
d16:	Year first attended any college	-0.37
d17:	Approximate G.P.A.	
d18:	Approximate high school average	0.38
d19:	Who does the student live with?	
d20:	Who in the family has attended college	
d21:	Income of parents when student left H.S.	0.19
d22:	Number of paid jobs:	0.52
d23:	Employed by this college?	
d24:	Ever in work study?	-0.17
d25:	Hours worked per week?	
d26:	Income earned per month?	
d27:	Percent of college paid by student	
d28:	Number of other colleges applied to?	-0.18

TABLE 4.7A -- Demographic Characteristics

STANDARDIZED DISCRIMINANT COEFFICIENTS
CONTINUING STUDENTS AGES 22-45

VARIABLE	VALUE
Spent time with academic advisor/Knew names of some of dean, president, SGA president	
Goes to athletic and sports events/General user of facilities/involvement	
Satisfaction with counseling services—all kinds	
Social involvement/Attendance at academic and social activities	-0.26
Chose because of cost and location/chose because of family and friends/Scheduling good/Has financial concerns/Came to change careers	0.18
Dissatisfaction with type and variety of courses	
Satisfaction with frequency and scheduling of courses	
Satisfaction with deans' services	
Expects to drop out or stop out	0.14
Has academic concerns	
Satisfied with accessibility and helpfulness of instructors, outside of class	
Satisfied with Admissions/Registrar/Business Offices	-0.14
Here to advance in job/College conflicts with personal life	0.32
Expects to be or is academically involved	
Expects to excell academically/Here to change careers	

TABLE 4.7B -- Second-level Factors

STANDARDIZED DISCRIMINANT COEFFICIENTS
CONTINUING STUDENTS AGES 22-45

VARIABLE	VALUE
Present income	-0.28
Savings	
Parents	-0.15
Spouse's income	-0.16
Repayable loans	-0.22
Scholarships, grants, gifts	
G.I. Bill	

TABLE 4.7C -- Importance of Types of Financial Support

<u>Discussion</u>

This section is divided into two parts. In the first part, entitled "Classification Results," the figures produced by the model and use of the weights are discussed. In the second part, entitled "Predictor Variable Analysis," the impact of the predictor variables and the kinds of predictor variables for different groups of students are discussed.

<u>Classification Results</u>   To the extent that it was developed in this study, the technique of using factor analytic procedures coupled with discriminant analyses to determine discriminant coefficients is limited in that improving the percentage of correctly classified non-returning students results in a potentially prohibitive increase in the number of incorrectly classified returning students.

Table 4.4 best reflects this situation. In almost every case the model was more accurate for returning than for non-returning students. In every case, for both returning students and in terms of total percentages, the model was more accurate for younger than for older students. For the non-returning groups, the model was more accurate for older than for younger students in every case but one, and the model was highly inaccurate for non-returning students in that particular case.

The use of the weights can best be determined by inspecting Tables 4.1 through 4.3. By decreasing the weights, the model decreases the percentage of incorrectly classified non-returning students and increases the percentage of correctly classified returning students. Increasing the weights has the opposite effect.

For example, in Table 4.3, using live data, a weight of minus two yielded a 94 percent accuracy for returning students and a 32 percent

accuracy for non-returning students. Increasing the weight to plus two resulted in decreasing the accuracy for returning students to 71 percent and increasing the accuracy for non-returning students to 76 percent. In the case of a weight of minus two, a retention program would have included 39 students, 14 of whom would have returned with no intervention. In the case of a weight of plus two, a retention program would have included 128 students, 68 of whom would have returned with no intervention. Thus, assuming a retention program with a given amount of resources, the mix of non-returning and returning students may be optimized to match the available resources. Left unanswered by this study is the question of identifying "hard core" non-persisters versus those students who would actually benefit from a retention program. Moving the weights to an extreme which would eliminate all but a few incorrectly identified returning students would probably result in identifying primarily "hard core" non-returning students and thus not improve the results of any program intended to minimize attrition.

Predictor Variable Analysis

The model supports the literature that sees attrition as multi-causal. Tables 4.5 through 4.7 contain the standardized discriminant coeffieicnts developed by the discriminant analyses used for the results shown in Tables 4.1 through 4.3.

For orientation students, ages 17-21, the single most powerful predictor was income earned per month. The more income earned, the more likely to not return to college, at least for the next academic term. The second, third, and fourth most important variables were the second-

level variables representing expectations of involvement with cultural activities, expectations of academic involvement, and concerns over financial matters. Planned academic involvement predicted persistence, while concerns over financial matters and expectations of cultural involvement predicted non-retention. Highest degree sought was next, followed by a sequence of predictors grouped at approximately the same strength and which included the importance of parental financial support and the importance of repayable loans for financing college, number of paid jobs, hours worked per week, and the importance of scholarships and the G. I. Bill for financing college. Highest degree sought predicted persistence. The higher the degree the stronger the prediction. Any of the financial factors mentioned predicted attrition. The more important the factors were, the stronger the prediction. Other predictors were race, change in marital status since entering college, and the second-level variable indicating expectations about being involved in athletics and use of recreational activity areas.

For continuing students, ages 17-21 (Table 4.6), the single most important predictors were hours worked per week and income earned per month. The more hours worked, the more powerful the prediction for attrition, but the more income earned the more powerful the prediction for retention. The next most important predictors were the second-level variable indicating satisfaction with Deans' services, and the variable indicating importance of savings for financing college. Both were predictors of persistence. These were followed by a group of predictors, all at approximately an equal level of strength, which included number of hours currently enrolled, classification (both predictors of reten-

tion), importance of scholarships, and percent of college paid by the student (both predictors of attrition.) These predictors were followed by a group of second-level variables, including expectations of becoming academically involved, and satisfaction with accessibility and helpfulness of instructors. All were predictors of persistence. The remainder of variables included approximate GPA, whether other members of the family had attended college, income of parents, number of paid jobs, whether the student was ever in work-study, number of hours currently enrolled, importance of present income, parental support, and the availability of the G. I. Bill for financing college, and two second-level variables--involvement in athletics, special events, and college activities and expectation of dropping or stopping out.

The three most important predictors for continuing students, ages 22-45 (Table 4.7), were number of hours currently enrolled, number of children, and classification. Classification and number of hours enrolled were predictors of persistence, but number of children was a predictor of attrition. These were followed by approximate high school average (persistence), year first attended any college (attrition), and a second-level variable consisting of factors related to going to college to advance in the student's present job (persistence). The next group of predictors of relatively equal strength included importance of repayable loans for financing college, importance of present income, and a second-level social involvement variable. All were predictors of attrition. The remainder of the predictors included race, parental income, whether the student was ever in work study, satisfaction with general administrative services, importance of parent's and spouse's income in

financing college, and two second-level variables--choice of college because of cost and location and expectation of dropping or stopping out.

The congruency model proposed by Tinto is correct for the College being studied. For traditional-age students, background variables played a relatively minor role in predicting attrition. Variables related to financing college were among the most important predictors for all groups, as were variables describing areas such as college goals, expectations, and involvement. Background variables such as race, sex, number of children, marital status, high school average, whether others in the family had attended college, and number of other colleges applied to were not among the most valid predictors.

Thus, for orientation students, the three second-level scores describing expectations of involvement with cultural activities, expectations of academic involvement, and concerns over financial matters were second only to income earned per month. For continuing students, ages 17-21, the only second-level factor variable to rank near the top of the list was satisfaction with deans' services, which ranked behind hours worked per week and income earned per month.

For continuing students, ages 22-45, background characteristics played a slightly greater role as predictors. The second-level score describing the importance of college for promotion or advancement in the student's present job was in the group which followed number of hours currently enrolled, number of children, and classification. Also in the group were approximate high school average and year first attended college.

The predictor variables for non-traditional students are different from those for traditional students. Variables that enter the prediction

formulas for non-traditional students but do not enter for either of the

groups ages 17-21 are number of children, year first attended any college,

number of other colleges applied to, and the two second-level factor

scores describing expectations of social involvement and coming to

college to advance in a present job. Three of the preceding five vari-

ables (number of children, year first attended any college, and coming

to college to advance in a present job) were among the top ranked predic-

tor variables for non-traditional students.

Variables that enter into the prediction formulas for one or another

of the traditional student groups studied but that do not enter for non-

traditional students are a change in marital status since entering col-

lege, highest degree sought, approximate GPA, whom the student lives

with, who in the family has attended college, number of paid jobs,

whether the student was employed by the college, hours worked per week,

income earned per month, percent of college paid by the student, impor-

tance of savings in financing college, importance of scholarships, grants

or gifts in financing college, importance of the G.I. Bill in financing

college, and seven second-level factor variables describing involvement

in athletics and recreation, expectations of procedural problems, aca-

demic involvement, divorce-oriented concerns, expectations of becoming

involved in cultural activities, and satisfaction with accessibility and

helpfulness of instructors outside of the classroom. Of these variables,

six (income earned per month, hours worked per week, importance of savings

in financing college, satisfaction with dean's services, expectations of

academic involvement, and expectations of cultural involvement), were

among the top-ranked predictors for one or another of the seventeen to

twenty-one aged group.

Congruency

It should be noted that a measure of college "press" is needed in order to really test the congruency concept. In this study the expectations of the environment were assumed, based on the well-known characteristics of the college being studied.

The concept of goal commitment is central to the congruency model. Essentially the argument is that the commitment to completing college is a function of a student's expectations and goals, and that these are modified by ongoing internal and external factors.

The congruency concept appears to be true for the college being studied. For orientation students, ages 17-21 for example, the higher the degree sought the more likely a student would be to persist. Commitment might also be measured by the number of paid jobs held by a student coupled with income earned per month. Number of jobs is a predictor of persistence, but income earned per month is a predictor of attrition. This result is consistent with Tinto's cost-benefit argument that a student's commitment to college will decrease as the benefits of alternative activity increase. The concept of goal commitment is further reinforced by the predictive strength (0.68) of the "expects academic involvement/chose because of family and friends/here to get ready for grad. school/curiosity" factor.

Some of the predictors of attrition for orientation students, however, seem unrelated to commitment or seem related to items which probably tend to actually reduce commitment to college. For example,

expecting to become involved in cultural events; having discrimination concerns, planning involvement in athletics or using general activity areas, and any type of financial concern are all predictors of attrition.

Although the pattern of predictors of retention for continuing students, ages 22-45, is different from the 17-21 year old orientation students, the congruency argument seems to continue to be valid. Classification and number of hours currently enrolled are both predictors of retention. Presumably, if an older student has elected to become classified (an option which can be exercised at any time prior to accumulating 90 credit hours) and has enrolled for six, nine, or twelve hours, then the commitment to completing college is probably strong. Academic background is important—High School Average is a modest (0.38) predictor of persistence. For this group of students, the second-level factor "Here to advance in job/college conflicts with personal life" is also a modest (0.39) predictor of persistence, thus further reinforcing the commitment concept.

Involvement with social activities is a predictor of attrition, as is any kind of financial concern, number of children, and year first attended any college. With older students especially, the concept of "stopping out" of college may be part of what is perceived to be attrition at the college. The pattern of variables which predict that the older, continuing students will not return also seems to lend support to the congruency argument. Factors which probably have a negative impact on commitment to complete college do predict attrition.

Goal commitment does not seem to play as strong a role for traditional aged, continuing students, even though the pattern of variables

which predict attrition and retention for this group is similar to the
previous two groups. Like the continuing students, ages 22-45, classifi-
cation, number of hours enrolled, and approximate GPA (high school
average for older students) are predictors of persistence. However,
hours worked per week and income earned per month (variables that did not
even enter into the formulas for older students) are strongly reversed
in the direction of prediction for the traditional aged, continuing group
of students. In this case, hours worked per week predicts attrition and
income earned per month predicts retention. Since these are continuing
students, one possible speculation about the issue is that the issue of
income versus goal commitment had been resolved in the past, and the
simple weight of too many hours of weekly paid employment takes its toll
in the expected manner.

The group of 17-21 aged continuing students also seems more tradi-
tional in the sense indicated by Astin. Most predictors which involve
satisfaction and/or involvement in college predict persistence. Thus
satisfaction with deans' services, helpfulness of instructors, and expec-
tation of academic involvement all predict persistence, as does expec-
ting to drop out or stop out of college. This last predictor has a
value of only 0.22, and may possibly be explained as a small lack of
confidence on the part of the student or as recognition of the number of
military dependents who attend. Finally, financial concerns do not
evolve a second-level factor for the traditional group of students.
However, percentage of college cost paid for by the student was a pre-
dictor of attrition, a result which is probably consistent with the
result that income earned per month is a predictor of retention for this

group. Reliance on savings to pay for college predicted persistence, a result which is not consistent with Astin's report.

While conclusions about specific aspects of congruency are probably not safe at this point, some general comments about the results of the research for the college used in this study seem appropriate. Tinto's model generally agrees with the basic congruency argument proposed by (among others) Feldman and Newcomb, with the exception that Tinto emphasizes background characteristics to a greater extent than do earlier versions of the concept. The model developed in this study incorporated this increased emphasis and expanded Tinto's model to include current environmental factors which are completely separate from the college environment. Acceptance of the model may suggest that a congruency model for non-traditional institutions must incorporate factors related to expectations and motivation, variables describing background, and factors or variables which relate to a student's environment external to the college. In one sense, as these external factors change, the commitment to complete college changes--thus a model where motivational factors dominate may be appropriate. In a non-traditional environment, however, external factors may play a more dominant role than in a traditional environment, thereby requiring a more direct incorporation of these factors into the model.

At the college used in this study the congruency model seems appropriate for orientation students and for non-traditional students. For the traditional, continuing student, however, the model proposed by Astin seemed more appropriate, suggesting that satisfaction and involvement in college may be more important than motivation and expectations

about college for the traditional student.

Summary

A model was developed that is capable of predicting which students will or will not persist in college. As a basis for the prediction, the model accepts raw data from questionnaires for continuing students and for orientation students. The model is designed to construct a sequence of scores from the raw data and to use a subset of the scores to calculate a "persistence score" and an "attrition score." The subset of the scores which is used is determined by the user of the model, who indicates which scores are to be used and what coefficients are to be applied to the scores.

The coefficients are determined by choosing the results from one of a sequence of discriminant analyses designed to generate the coefficients for the model. Different discriminant analyses are performed for different segments of the base population, thus generating coefficients from a group that best represents the population being modeled. Finally, weights can be supplied to the model, causing a deliberate error in the number of false positive classifications. The technique is designed to permit the user of the model to match the mix of correctly and incorrectly classified students with whatever external constraints might exist.

For the particular discriminant analyses and groups selected, up to eighty percent of the non-returning over twenty-one age group was correctly identified, and up to forty-six percent of the under twenty-two non-returning group was correctly identified. Other discriminant analyses and/or other sets of variables will yield different percentages.

The model demonstrated that for the particular college being studied, attrition is indeed a multi-faceted phenomenon. Twenty different variables entered into the prediction formulas for orientation students, ages 17-21, 22 for continuing students ages 17-21, and 18 for continuing students, ages 22-45.

The model demonstrated that for the particular college being studied, the theory proposed by Tinto can be tentaively accepted. Some background characteristics entered the prediction formulas for non-traditional and traditional students, and expected involvement factors played an important role for orientation students, satisfaction factors for continuing traditionally aged students, and job-related factors for continuing non-traditional students.

Finally, the model demonstrated that the variables which predict attrition for the non-traditional students are not the same as the variables which predict attrition for traditional students. Quantitatively, five variables that entered the prediction formulas for non-traditional students did not enter the formulas for either of the traditionally aged students, and 23 variables that entered the formulas for traditionally aged students did not enter the formula for non-traditional students.

To conclude, the model that was constructed and used to predict attrition demonstrated that for the college being studied, attrition is a multi-faceted phenonemon, that Tinto's model is appropriate, and that the factors which enter into the prediction equations are different for different aged students.

At the college used in this study the congruency model seems appropriate for orientation students and for non-traditional students.

For the traditional, continuing student, however, the model proposed by Astin seem more appropriate, suggesting that satisfaction and involvement in college may be more important than motivation and expectations about college for the traditional student.

CHAPTER V: SUMMARY

The purpose of the study was to determine whether the variables related to students' goals, reasons for attending college, academic background, socioeconomic background, basic demographic characteristics, expectations about college, source of financial support, participation in college activities, use of college facilities, and college choice criteria could be successfully incorporated into a multi-variate analysis capable of predicting attrition at an urban institution. Central to the study was a test of Tinto's theoretical model of attrition, a model that suggests in part that while background characteristics are important in predicting attrition, student expectational and motivational attributes are at least equally important (Tinto, 1975, p. 93). Equally important was a test of the suggestion, which appears in virtually every synthesis of the literature, that the attrition phenomenon is multi-faceted.

Background

The college used for the study is an urban, commuting institution with a large percentage of non-traditional students. Little research has been attempted on the attrition phenonemon at such colleges, and little is known about the nature of the attrition phenonemon for non-traditional students.

The literature suggested several implications for this study. Background characteristics (demographic, SES, and financial) were collected and used as only part of the prediction process. Tinto's theory clearly suggests that these factors are not the major elements involved

in predicting attrition, although other results suggest that one breakdown or another of these relatively simple, well defined elements may actually be predictive. Academic information was collected and treated in a similar fashion. The other two major themes incorporated in the study have been designated "college environmental factors" (satisfaction, use of facilities, participation in activities, and general involvement in college) and "individual factors" (reasons for attending, college choice criteria, expectations about college, anticipated activities).

Method

Two groups of students were identified--students who attended the orientation program and continuing students. Parallel questionnaires were administered to each group. A total of 1314 students responded.

For each group the items in the questionnaire were divided into logical subsets. Each subset was factor analyzed and factor scores for each resulting factor were calculated for each student. The resulting factor scores were factor analyzed, and factor scores for each resulting factor were again calculated for each student. For each group, these final factor scores were combined with demographic and financial support data and entered into various discriminant analyses to develop discriminant coefficients. Each analysis yields a separate set of coefficients. The discriminant coefficients become part of the basic data entered into a model to predict student attrition.

Discussion

A model was developed to predict which students would or would not persist in the college studied. As a basis for the prediction, the model

accepts raw data from a questionnaire containing 209 items for continuing students or 154 items for orientation students. The model is designed to build up a sequence of scores from the raw data and to use a subset of these scores to calculate a "persistence score" and an "attrition score." The subset of the scores which is used is determined by the user of the model, who indicates which scores are to be used and what coefficients are to be applied to the scores.

The coefficients are determined by choosing the results from one of a sequence of discriminant analyses designed to generate the coefficients for the model. Different discriminant analyses are performed for the various segments of the base population, thus generating coefficients from a group which best represents the population being modeled. Finally, weights can be supplied to the model, causing a deliberate error in the number of false positive classifications. The technique is designed to permit the user of the model to match the mix of correctly and incorrectly classified students with the resources available to deal with the problem.

For the particular discriminant analyses and groups selected, up to eighty percent of the non-returning over twenty-one age agroup was correctly identified, and up to forty-six percent of the under twenty-two non-returning group was correctly identified. Different discriminant analyses and/or different sets of variables will yield other results.

The model demonstrated that for the college being studied, attrition is indeed a multi-faceted phenomenon. Twenty different variables entered into the prediction formulas for orientation students, ages 17-21, 22 for continuing students ages 17-21, and 18 for continuing

students, ages 22-45.

The model also demonstrated that for the college being studied, the congruency model proposed by Tinto can be accepted. Some background characteristics entered the prediction formulas for non-traditional and traditional students, and expected involvement factors played an important role for orientation students, satisfaction factors for continuing traditionally aged students, and job related factors for continuing non-traditional students.

For traditional-age students, background variables played a relatively minor role in predicting attrition. Variables related to financing college were among the most important predictors for all groups, as were variables describing areas such as college goals, expectations, and involvement. Background variables such as race, sex, number of children, marital status, high school average, whether others in the family had attended college, and number of other colleges applied to were not among the most important predictors.

Thus, for orientation students, the three second-level scores describing expectations of involvement with cultural activities, expectations of academic involvement, and concerns over financial matters were second only to income earned per month. For continuing students, ages 17-21, the only second-level factor variable to rank near the top of the list was satisfaction with deans' services, which ranked behind hours worked per week and income earned per month.

For continuing students, ages 22-45, background characteristics played a slightly greater role as predictors. The second-level score describing the importance of college for promotion or advancement in the

student's present job was in the group which followed number of hours

currently enrolled, number of children, and classification. Also in the

group was approximate high school average and year first attended any

college.

Finally, the model demonstrated that the variables that predict

attrition for the non-traditional students are not the same as the vari-

ables which predict attrition for traditional students. In a purely

quantitative sense, five variables that entered the prediction formulas

for non-traditional students did not enter the formulas for either of

the traditionally aged students, and 23 variables which entered the

formulas for traditionally aged students did not enter the formula for

non-traditional students.

Variables that enter the prediction formulas for non-traditional

students but do not enter for either of the groups ages 17-21 are number

of children, year first attended any college, number of other colleges

applied to, and the two second-level factor scores describing expecta-

tions of social involvement and coming to college to advance in a present

job. Three of the preceding five variables (number of children, year

first attended any college, and coming to college to advance in a present

job) were among the top ranked predictor variables for non-traditional

students.

Variables that enter into the prediction formulas for one or another

of the traditional student groups studied but that do not enter for non-

traditional students are a change in marital status since entering

college, highest degree sought, approximate GPA, whom the student lives

with, who in the family has attended college, number of paid jobs,

whether the student was employed by the college, hours worked per week,

income earned per month, percent of college costs paid by the student,

importance of savings in financing college, importance of scholarships,

grants or gifts in financing college, importance of the G.I. Bill in

financing college, and seven second-level factor variables describing

involvement in athletics and recreational areas, expectations of pro-

cedural problems, academic involvement, divorce-orientated concerns,

expectations of becoming involved in cultural activites, and satisfaction

with accessibility and helpfulness of instructors outside of the class-

room. Of these variables, six (income earned per month, hours worked

per week, importance of savings in financing college, satisfaction with

deans' services, expectations of academic involvement, and expectations

of cultural involvement), were among the top-ranked predictors for one

or another of the seventeen to twenty-one aged group.

Finally, Tinto's model generally agrees with the basic congruency

argument proposed by (among others) Feldman and Newcomb, with the excep-

tion that Tinto emphasizes background characteristics to a greater extent

than do earlier versions of the concept. The model developed in this

study incorporated this increased emphasis and expanded Tinto's model to

include current environmental factors which are completely separate from

the college environment. Acceptance of the model may suggest that a

congruency model for non-traditional institutions must incorporate fac-

tors related to expectations and motivation, variables describing back-

ground, and factor or variables which relate to a student's environment

external to the college. In one sense, as these external factors change,

the commitment to complete college changes--thus a model where motiva-

tional factors dominate may be appropriate. In a non-traditional environment, however, external factors may play a more dominant role than in a traditional environment, thereby requiring a more direct incorporation of these factors into the model.

At the college used in this study the congruency model seems appropriate for orientation students and for non-traditional students. For the traditional, continuing student, however, the model proposed by Astin seemed more appropriate, suggesting that satisfaction and involvement in college may be more important than motivation and expectations about college for the traditional student.

Suggestions for Future Research

Each step in the process developed in this study lends itself to more precise development. In this section the points where such expansions seem possible are identified.

Instrumentation   The questionnaires used to collect the raw data are long and involved. Better, more precise, and shorter, instruments are needed. Further research into extracting the underlying factors from the questionnaires would also be useful. Permitting oblique rotation, sectioning the questionnaires into groups that more closely match the groups entering the model, or performing second-level factor analyses on the correlation coefficients between the first-level factors (similar to the development of Thurstone's "g") rather than the first-level factor scores might increase the accuracy of the factors that enter the final model.

Extension of Factor Analysis Results   The results from the factor
analyses lend themselves to several interesting questions, the answers
to which might in themselves direct future efforts in attrition studies.
For example, do orientation students have different aspirations than con-
tinuing students? If such differences exist, are they further delineated
by other demographic characteristics such as age, sex, or race? A re-
search design that attempts to measure significant differences in the
factors underlying different groups would begin to get at the answers to
such questions.

Different Modeling Techniques   The technique of generating discriminant
coefficients for different subgroups of the population presents an oppor-
tunity for expanded research. The accuracy of the model might be
improved, for example, by refining the subgroups entered into the dis-
criminant analysis. Such refinement might take the form of further
breakdown by demographic characteristics or, perhaps more interestingly
by the strength of selected types of factors. It would be possible, for
example, to consider all the factors related to academic involvement and
permit the discriminant analysis to create coefficients based on all
students who scored at some level on the selected factors.

Usefulness of the Model   A test is needed to determine the potential
uses of the techniques of identifying potential dropouts as developed in
this study. One way to perform the test would be to select a standard
control group, research design, and to implement a retention program on
a sample or samples of the predicted non-returning students. A design
that involves a retention program for a sample of predicted dropouts and
a sample of students who did not take the questionnaire versus no program

for a sample of predicted dropouts and a sample of students who did not take the questionnaire might be appropriate. Such a design would help to determine the ability of the model to identify students who might actually be helped by a retention program versus the ability to identify stopouts or "hard core" dropouts.

The usefulness of the model can be further tested by engaging in a longitudinal study of the predicted results. Two questions which immediately present themselves are whether the students incorrectly classified as dropouts ever actually do drop out and whether a given set of discriminant coefficients work over time or need to be recomputed for subsequent years.

Congruence Problem   The theories on congruence suggest that variables defining congruence be identified for both the student and the institution. This study focused on the students. The problem of determining and measuring the variables for an institution seems complex. Such variables as the level of student involvement expected by a college, or the educational outcome that should be achieved by a student are simply not well defined, thus not measurable at the present time. Finally, the problem of comparing these variables with the expectational and motivational variables for a given student seems even more complex.

It seems safe to conclude, however, that such studies are needed if educators at individual institutions are to begin to understand the nature of attrition at their institution.

APPENDIX I

DETAIL OF FIRST-LEVEL FACTORS FOR

ORIENTATION STUDENTS

SECTION TITLE: ANTICIPATED ACTIVITY IN COLLEGE

QUESTION: While at Christopher Newport, what is your best
            guess that you will:

Factor: Dropout or stopout – negative feeling.
Eigenvalue: 5.08; Percent of variation: 25.2%   Loading
Main Elements--
     Dropout of school for a semester or more   0.58
     Dropout of school several different times   0.86
     Quit   0.83
     Flunkout   0.58
Negative Elements--
     Graduate   -0.39
Other Elements--
     Change majors   0.34
     Become angry at procedures   0.32
     Have problems with a professor   0.29

Factor: Become academically involved.
Eigenvalue: 3.31; Percent of variation: 16.4%
Main Elements--
     Meet the Dean   0.91
     Meet the President   0.93
     Join an academic club   0.44
     Get on the honor role   0.48
Other Elements--
     Be elected to an office   0.31
     Be invited to a faculty member's home   0.32
     Graduate with honors   0.32

Factor: Become involved in athletics.
Eigenvalue: 2.43; Percent of variation: 12.0%
Main Elements--
     Try out for an athletic team   0.98
     Make an athletic team   0.92
     Attend sports events   0.50

Factor: Become involved in cultural activities.
Eigenvalue: 1.76%; Percent of variation: 8.7%
Main Elements--
     Try out for a dramatic or musical event   0.95
     Participate in a dramatic or musical event   0.94
Other Elements--
     Join a social club   0.31

Factor: Have procedural problems.
Eigenvalue: 1.75; Percent of variation: 8.6%
Main Elements--
     Become angry at procedures   0.61

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Have problems with a professor	0.56
Have something of yours stolen	0.65
Be inconvenienced by an administrative error	0.74
Other Elements--	
Fail a course	0.27
Take a CLEP test	0.27

Factor: Challenge a course - take the GRE
Eigenvalue: 1.26; Percent of variation: 6.3%

Main Elements--	
Challenge a course	0.76
Take the Graduate Record Exam	0.71
Take a CLEP test	0.39
Other Elements--	
Be elected to an office	0.28
Join a social club	0.25
Attend cultural events	0.22
Graduate with honors	0.26
Negative Elements--	
Change majors	-0.25

Factor: Become socially involved.
Eigenvalue: 1.11; Percent of variation: 5.5%

Main Elements--	
Get married	0.58
Join an academic club	0.60
Join a social club	0.43
Attend cultural events	0.42

Factor: Have academic success.
Eignevalue: 0.97; Percent of variation: 4.8%

Main Elements--	
Graduate with honors	0.40
Other Elements--	
Get on the honor role	0.35
Negative Elements--	
Fail a course	-0.78

Factor: Dropout or stopout--positive feeling.
Eigenvalue: 0.70; Percent of variation: 3.5%

Main Elements--	
Decide that need no more education, met needs	0.46
Other Elements--	
Dropout for a semester or more	0.35
Negative Elements--	
Graduate	-0.63

Factor: "Private" social involvement.
Eigenvalue: 0.63; Percent of variation: 3.1%
Main Elements--

Develop a new friendship	0.65

Other Elements--

Transfer before graduating	0.37
Attend sports events	0.33
Join a social club	0.29

Factor: College--yes, but not #1.
Eigenvalue: 0.60; Percent of variation: 3.0%
Main Elements--

Take a job in addition to my studies	0.50

Other Elements--

Graduate	0.31
Attend sports events	0.30

Negative Elements--

Be invited to a faculty member's home	-0.26
Be elected to an office	-0.23

Factor: Divorce concerns.
Eigenvalue: 0.58; Percent of variation: 2.9%
Main Elements--

Get divorced	0.48

Negative Elements--

Join a social club	-0.23
Challenge a course	-0.21

SECTION TITLE: POTENTIAL PROBLEMS

QUESTION: Rate the following factors as they might affect your
educational progress at CNC.

Factor: Discrimination concerns--all kinds.
Eigenvalue: 13.5; Percent of variation: 51.4%
Main Elements--

Discriminated against by students--sex	0.88
Discriminated against by faculty--sex	0.81
Discriminated against by students--age	0.71
Discriminated against by faculty--age	0.78
Discriminated against by students--race	0.67
Discriminated against by faculty--race	0.66

Other Elements--

Factor: Don't like college
Eigenvalue: 3.45; Percent of variation: 13.2%
Main Elements--

Don't feel part of the college	0.64
Just don't like college	0.76
Just don't like this college	0.70

Other Elements--

Don't like the faculty in my major	0.50
No administrators or faculty to discuss problems	0.48

Job conflicts with school	0.43
Too many other responsibilities	0.40

Factor: Financial concerns.
Eigenvalue: 2.09; Percent of variation: 8.0%
Main Elements--

School too expensive	0.78
Not enough money for school	0.74
Need more money	0.74
Financial aid insufficient	0.68
Applied for, but can't get financial aid	0.67

Other Elements--

Too many other responsibilities	0.45
Study too time consuming	0.38
Weak math background	0.31
Poor study habits	0.29

Factor: Uncertain about the desirability of attending college.
Eigenvalue: 1.70; Percent of variation: 6.5%
Main Elements--

Bored with school	0.70
Not sure I've picked the right major	0.58
Can't get child care	0.55
Poor study habits	0.54

Other Elements--

Weak Mathematical background	0.39
Study too time consuming	0.37
Job conflicts with school	0.36
Just don't like college	0.34
Don't like the faculty in my mjaor	0.31

Factor: Academic concerns.
Eigenvalue: 1.31; Percent of variation: 5.0%

Grades too low	0.65
Courses too difficult	0.77

Other Elements--

Not enough electives related to my interests	0.31
Study too time consuming	0.34
Weak English background	0.32
Needed courses not available here	0.27

Factor: Child care problems.
Eigenvalue: 1.07; Percent of variation: 4.1%
Main Elements--

Can't get child care	0.83
Child care costs a lot	0.75

Other Elements--

Going to get married	0.35
Courses offered not related to my cultural background	0.33

Factor: Need a job.
Eigenvalue: 0.93; Percent of variation: 3.6%
Main Elements--
    Need a job   0.71
    Can't find a job   0.89
Other Elements--
    Courses offered not related to my cultural background   0.24

Factor: Don't fit into the environment.
Eigenvalue: 0.85; Percent of variation: 3.3%
Main Elements--
    No friends here   0.50
    Discriminated against by students--race   0.44
    Discriminated against by faculty--race   0.45
    Don't feel part of the college   0.50

SECTION TITLE: REASONS FOR ATTENDING/GOALS:

QUESTION: The following reflect typical reasons why students enter
college. Please indicate the importance of each to you.

Factor: General self improvement.
Eigenvalue: 5.55; Percent of variation: 49.4%
Main Elements--
    Improve leadership skills   0.79
    Improve life style   0.72
    Meet people   0.63
    Improve self image   0.60
Other Elements--
    Improve ability to get along with people   0.46
    Increase participation in social and cultural events   0.36

Factor: Academic curiosity.
Eigenvalue: 1.69; Percent of variation: 15.1%
Main Elements--
    Learn about things   0.77
    Satisfy curiosity about areas of knowledge   0.71
Other Elements--
    Increase knowledge in academic field   0.42
    Learn specific skills to enrich my daily life   0.39
    Increase my intelligence   0.43
    Get along with people   0.31
    Discover my vocational interests   0.35
Negative Elements--
    Avoid getting a job   -0.16

Factor: Become involved in college activities.
Eigenvalue: 1.13; Percent of variation: 10.1%
Main Elements--
    To engage in campus life   0.88

Increase participation in social and cultural events	0.76

Other Elements--

Improve ability to get along with people	0.41
Meet people	0.43
Satisfy parents	0.33

Factor: Advance in present job.
Eigenvalue: 0.94; Percent of variation: 8.4%
Main Elements--

Raise or promotion in present job	0.73
Knowledge and skills for present job	0.61

Other Elements--

Enrichment of daily skills	0.39
Improve my self image	0.33

Factor: Default action.
Eigenvalue: 0.75; Percent of variation: 6.7%
Main Elements--

Avoid getting a job	0.64
Nothing else to do	0.77

Other Elements--

Satisfy my parents	0.40

Factor: Change careers.
Eigenvalue: 0.60; Percent of variation: 5.3%
Main Elements--

Prepare for a new career	0.66

Other Elements--

Improve earning ability	0.37

Factor: Get ready for graduate school.
Eigenvalue: 0.55; Percent of variation: 4.9%
Main Elements--

Prepare for graduate school	0.72

Negative Elements--

Meet people	-0.11
Improve earning ability	-0.21

SECTION TITLE: USE OF FACILITIES

QUESTION: How often do you expect to make use of the:

Factor: Use activity areas.
Eigenvalue: 1.91; Percent of variation: 64.9%
Main Elements--

Game rooms	0.65
Parking lot for socializing	0.60

Other Elements--

Campus center	0.49
Pub	0.53

Gym   0.52

Factor: Use academic areas.
Eigenvalue: 1.04%; Percent of variation: 35.1%
Main Elements--
    Study rooms   0.82
    Library   0.74

SECTION TITLE: CHOICE CRITERIA

QUESTION: A person's decision to attend a particular college
           frequently is influenced by a number of factors. You
           are asked here to indicate how important each of the
           following factors was to your decision to attend CNC.

Factor: Scheduling and choice of courses.
Eigenvalue: 2.14; Percent of variation: 35.1%
Main Elements--
    Availability of courses   0.84
    Flexibility of schedules   0.63
Other Elements--
    Reputation as a good college   0.56

Factor: Influence of family and friends.
Eigenvalue: 0.95; Percent of variation: 24.4%
Main Elements--
    Influenced by family   0.92
Other Elements--
    Influenced by friends   0.49
    Reputation of the college   0.29

Factor: Cost and location.
Eigenvalue: 0.81; Percent of variation: 20.8%
Main Elements--
    Low tuition and fees   0.78
Other Elements--
    Distance to college from residence   0.44
    Availability of financial aid   0.51

APPENDIX II

DETAIL OF FIRST-LEVEL FACTORS FOR

CONTINUING STUDENTS

SECTION TITLE: ANTICIPATED ACTIVITY IN COLLEGE
QUESTION: While at Christopher Newport, what is your best
           guess that you will:

Factor: Become involved in athletics.
Eigenvalue: 5.4; Percent of variation: 31.3%   Loading
Main Elements--
     Try out for an athletic team   0.95
     Make an athletic team   0.93
Other Elements--
     Attend sports events   0.42

Factor: Become involved in cultural activities.
Eigenvalue: 2.5; Percent of variation: 14.4%
Main Elements--
     Try out for a dramatic or musical event   0.93
     Make a dramatic or musical event   0.94
Other Elements--
     Attend cultural events   0.22
     Be elected to an office   0.21

Factor: Become academically involved.
Eigenvalue: 1.9; Percent of variation: 11.0%
Main Elements--
     Meet the Dean   0.84
     Meet the President   0.86
Other Elements--
     Be invited to a faculty members home   0.40
     Be elected to an office   0.21

Factor: Have procedural problems.
Eigenvalue: 1.6; Percent of variation: 9.1%
Main Elements--
     Be inconvenienced by an administrative error   0.78
Other Elements--
     Become angry at procedures   0.55
     Have problems with a professor   0.51
     Have something stolen   0.42

Factor: Dropout or Stopout
Eigenvalue: 1.23; Percent of variation: 7.1%
Main Elements--
     Dropout for a semester or more   0.71
     Dropout several different times   0.91
Other Elements--
     Quit   0.43
     Change Majors   0.28

Factor: Excel academically.

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Factor: Financial concerns.
Eigenvalue: 2:12; Percent of variation: 9.2%
Main Elements--

Financial aid insufficient	0.77
Not enough money for school	0.72
Need more money	0.66
Applied for, but can't get financial aid	0.65
School is too expensive	0.59

Other Elements--

Child care costs a lot	0.31
Can't find a job	0.29

Factor: Academic concerns.
Eigenvalue: 1.47; Percent of variation: 6.4%
Main Elements--

Grades too low	0.62
Courses too difficult	0.75

Other Elements--

Weak English background	0.48
Weak Math background	0.41
Poor study habits	0.41
Not sure I've picked the right major	0.38
Study is too time consuming	0.35

Factor: College conflicts with personal life.
Eigenvalue: 1.27; Percent of variation: 5.5%
Main Elements--

Too many other responsibilities	0.65
Study is too time consuming	0.62
Job conflicts with school	0.59

Other Elements--

Schedule doesn't fit my personal schedule	0.49
Poor study habits	0.30
Need more money	0.28
Bored with school	0.28

Factor: Don't fit into the environment.
Eigenvalue: 1.12; Percent of variation: 4.8%
Main Elements--

Don't feel part of the college	0.62
No extracurricular activities of my interest	0.61
No friends here	0.57

Other Elements--

Courses offered not related to my cultural background	0.37
No persons related to my cultural background	0.44

SECTION: REASONS FOR ATTENDING/GOALS

QUESTION: The following reflect typical reasons why students enter
college. Please indicate the importance of each to you.

Factor: Academic curiosity.
Eigenvalue: 5.26; Percent of variation: 53.3%
Main Elements--
    Learn about things   0.83
    Satisfy curiosity   0.80
    Increase intelligence   0.58
Other Elements--
    Increase academic knowledge   0.31
    Improve self image   0.41
    Increase specific skills to enrich daily life   0.43

Factor: Become involved in college activities.
Eigenvalue: 1.77; Percent of variation: 17.7%
Main Elements--
    Engage in campus life   0.80
    Become involved in social and cultural events   0.74
    To meet people   0.62
Other Elements--
    Increase ability to get along with people   0.54
    Improve leadership skills   0.35

Factor: Advance in present job.
Eigenvalue: 1.30; Percent of variation: 13.2%
Main Elements--
    Increase skills for present job   0.79
    Increase chance of raise on present job   0.75
Other Elements--
    Improve earning ability   0.40
    Improve life style   0.44
    Improve leadership skills   0.51
    Improve self image   0.41

Factor: Change careers
Eigenvalue: 0.83; Percent of variation: 8.4%
Main Elements--
    Prepare for a new career   0.68
Other Elements--
    Discover my vocational interests   0.33
    Prepare for graduate school   0.44
    Improve my earning ability   0.36

Factor: Default action.
Eigenvalue: 0.72; Percent of variation: 7.3%
Main Elements--
    Nothing else to do   0.75
    Avoid getting a job   0.58

Other Elements--
     Satisfy my parents   0.29

SECTION TITLE: ADMINISTRATIVE SATISFACTION

QUESTION: How satisfied are you with your experiences in the following areas?

Factor: "Extra-college" services.
Eigenvalue: 6.9; Percent of variation: 63.5%
Main Elements--

Child care services	0.79
Health services	0.77
Food services	0.59

Other Elements--

Recreational and athletic facilities	0.47
Social activities	0.50
Campus center	0.48
Parking facilities	0.46
Bookstore	0.39

Factor: Deans' services.
Eigenvalue: 1.60; Percent of variation: 14.6%
Main Elements--

Academic deans	0.85
Dean of students	0.75

Other Elements--

Basic studies program	0.50
Social Activities	0.45
Campus center	0.39

Factor: Counseling services.
Eigenvalue: 1.4; Percent of variation: 12.7%
Main Elements--

Counseling center academic advising	0.95
Counseling center career advising	0.86
Non-faculty academic advising	0.62

Factor: General services.
Eigenvalue: 1.0; Percent of variation: 9.1%
Main Elements--

Admissions office	0.81
Registrar's office	0.80
Business office	0.70

SECTION TITLE: ACADEMIC SATISFACTION

QUESTION: How satisfied are you with your experiences in the
           following areas?

Factor: Frequency and scheduling of courses.
Eigenvalue: 6.37; Percent of variation: 64.3%
Main Elements--
     Scheduling of courses wanted   0.88
     Frequency of courses wanted   0.82
     Scheduling of courses needed   0.86
     Frequency of courses needed   0.73

Factor: Accessibility and helpfulness of instructors.
Eigenvalue: 1.85; Percent of variation: 18.7%
Main Elements--
     Accessibility of instructors, not course related   0.83
     Accessibility of instructors, course related   0.76
     Instructor helpfulness with career plans   0.59
     Interaction with faculty, outside of class   0.69
Other Elements--
     Faculty academic advising   0.50
     Interaction with other students (academic)   0.51

Factor: Type and variety of courses.
Eigenvalue: 1.00; Percent of variation: 10.2%
Main Elements--
     Variety of courses in my major   0.73
     Type of courses required   0.71
     Variety of electives available   0.61
Other Elenents--
     Frequency of offering of needed courses   0.29

Factor: Quality of instruction.
Eigenvalue: 0.67; Percent of variation: 6.8%
Main Elements--
     Quality of instruction in required courses   0.57
     Quality of instruction in electives   0.77
     Frequency of offering of needed courses   0.67
Other Elements--
     Instructor helpfulness in career advising   0.32
     Faculty academic advising   0.32

SECTION TITLE: USE OF FACILITIES

QUESTION: How frequently do you expect to attend:

Factor: Athletics and special activities.
Eigenvalue: 1.76; Percent of variation: 79.6%
Main Elements--
     Athletic events   0.67

Other special events   0.71

Factor: Academic and social activities.
Eigenvalue: 0.45; Percent of variation: 20.4%
Main Elements--
    Academic clubs   0.67
    Social clubs   0.57
    Student government meetings   0.43

SECTION TITLE: CHOICE CRITERIA

QUESTION: A person's decision to attend a particular college
           frequently is influenced by a number of factors. You
           are asked here to indicate how important each of the
           following factors was to your decision to attend CNC.

Factor: Scheduling and choice of courses.
Eigenvalue: 1.71; Percent of variation: 54.4%
Main Elements--
    Availability of courses needed   0.74
    Flexibility of scheduling of courses   0.70

Factor: Influenced by family and friends.
Eigenvalue: 0.94; Percent of variation: 29.9%
Main Elements--
    Influenced by friends   0.70
    Influenced by family   0.61
Other Elements--
    Reputation as a good college   0.43

Factor: Cost and location.
Eigenvalue: 0.81; Percent of variation: 20.8%
Main Elements--
    Low Tuition   0.64
Other Elements--
    Availability of financial aid   0.53
    Distance from home to school   0.30

APPENDIX III

PROGRAM FOR THE PREDICTION MODEL

```
//PREDCT JOB (1656.W097,6,2),'STAMAN EM',MSGLEVEL=1,CLASS=A
// EXEC FORTGCLG,PARM.FORT='NOSOURCE,NOMAP'
//FORT.SYSIN DD *
       DOUBLE PRECISION COEFF(8,43,12),MEAN(8,43),FACSCO(45),WT(19),
      1L2COF(45,17),L2MEAN(45),L2DEV(45),L2SCO(17),DCOF1(40),DCOF2(40),
      2GROUP1,GROUP2,SDEV(8,43),STUDNT(8,43),SCORES(100)
       INTEGER DEMO(29),MONY(7),LYER(16),FT,TRNSFR,YES,
      1WKS,NSCOR(8),BEGPT(8),NFACT(8),RAWIN(222),TEST,RETCD,
      2RVALUE(19,1000),PVALUE(19),Z5,Z6,Z8,Z9,MAP(60)
       EQUIVALENCE (DEMO,RAWIN(1)),(MONY,RAWIN(148)),(LYER,RAWIN(199)),
      1(FT,RAWIN(219)),(WKS,RAWIN(218)),(RETCD,RAWIN(155))
       DATA YES/'Y'/,NSCOR/7,6,43,34,21,8,16,21/,WT/19*0.0/,
      1BEGPT/29,36,42,85,119,140,162,178/,STUDNT/344*0./
C
C   READ VARIABLE TO DETERMINE WHETHER THIS IS TEST OR LIVE DATA.
C
       READ (5,1) IVRFY
       IF (IVRFY .EQ. 1) WRITE (6,107)
107    FORMAT (' *****THIS IS A VERIFICATION RUN.' )
C
C   READ IN INITIAL VALUES FOR THIS SIMULATION.
C   VALUES ARE --
C               1.   NUMBER OF SETS OF QUESTIONS TO BE CONSIDERED.
C                    NSETS=6 FOR ORIENTATION STUDENTS AND 8 FOR OTHERS.
C               2.   WHICH GROUP?   TEST=1 FOR FIRST TIME, 0 FOR OTHERS.
C               3.   LOWER AND UPPER AGE LIMITS TO BE CONSIDERED.
C               4.   NUMBER OF FACTORS IN EACH SET OF QUESTIONS.
C
      . READ (5,1) NSETS,TEST,IAGE1,IAGE2,(NFACT(I),I=1,NSETS)
1      FORMAT (4I2,20I3)
       WRITE (6,103) NSETS,TEST,IAGE1,IAGE2,NFACT
103    FORMAT ('0 NUMBER OF SETS OF FACTORS=',I5,/,' TEST TYPE (IF FT IS
      1 1, THEN ORIENTATION STUDENTS, ELSE CONTINUING): FT=',I5,/,
      2' LOWER AND UPPER AGE LIMITS (INCLUSIVE)=',2I4,/,
      3' NUMBER OF FACTORS IN THE SETS ARE:',20I4,//)
C
       READ (5,110) NWTS,(WT(I),I=1,NWTS)
       WRITE (6,111) (WT(I),I=1,NWTS)
111    FORMAT (' WEIGHTS FOR THIS RUN',19F5.1)
110     FORMAT (I1,19F4.1)
C   READ IN THE MAP FOR THIS SIMULATION
C
C   MAP:
C   D01 D02 D03 D04 D05 D06 D07 D08 D09 D10 D11 D12 D13 D14 D15 D16
C    1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16
C
C   D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 D28 D29 M01 M02 M03 M04
C    17  18  19  20  21  22  23  24  25  26  27  28  29  30  31  32  33
C
C   M05 M06 M07 L01 L02 L03 L04 L05 L06 L07 L08 L09 L10 L11 L12 L13
C    34  35  36  37  38  39  40  41  42  43  44  45  46  47  48  49
C
C   L14 L15 L16 U01 U02 U03 U04 U05 U06 U07 U08 U09 U10 U11 U12 U13
C    50  51  52  53  54  55  56  57  58  59  60  61  62  63  64  65
```

```
C
C  U14 U15 U16 U17
C    66  67  68  69
C
       READ (5,201) NMAP,(MAP(I),I=1,NMAP)
201    FORMAT (40I2)
       WRITE (6,202) (MAP(I),I=1,NMAP)
202    FORMAT ('0MAP USED FOR THIS SIMULATION--',/,1X,40I3,//)
C
C  READ FACTOR SCORE COEFFICIENTS FROM FIRST LEVEL FACTOR ANALYSIS
C       INTO COEFF; MEANS AND STANDARD DEVIATIONS FOR THE RESULTS OF
C       EACH QUESTION INTO MEAN AND SDEV; FACTOR SCORE COEFFICIENTS
C       FROM SECOND LEVEL FACTOR ANALYSIS INTO L2COF; MEANS AND
C       STANDARD DEVIATIONS OF THE FIRST LEVEL FACTOR SCORES INTO
C       L2MEAN AND L2DEV;  AND FINALLY THE COEFFICIENTS OF THE TWO
C       DISCRIMINANT EQUATIONS INTO DCOF1 AND DCOF2.....WHEW!
C
C  Z5,Z6,Z8,Z9 ARE ALL SYMBOLLIC FT #'S.  HOORAY FOR IBM JCL.
C    SCHEME: FT #'S 15,16,25,26 ARE FIRST TIME DATA SETS, AND
C            FT #'S 18,19,28,29 ARE CONTINUING STUDENT DATA SETS.
C
       Z5 = 18
       IF (TEST .EQ. 1) Z5 = 15
       Z6 = Z5 + 1
       Z8 = Z5 + 10
       Z9 = Z6 + 10
       WRITE (6,104)
104    FORMAT ('1COEFFICIENTS, MEANS, AND STAND. DEVNS. FOR FIRST LEVEL
      1FACTOR SCORES FOLLOW ---',//)
       DO 2 KSET = 1,NSETS
       I = NSCOR(KSET)
       K = NFACT(KSET)
       WRITE (6,105) KSET,I,K
105    FORMAT ('0SET NO.',I3,' WITH',I3,' SCORES AND',I3,' FACTORS',/)
       DO 101 J = 1,I
       READ (Z5,33) (COEFF(KSET,J,L),L=1,K)
101    CONTINUE
       READ (Z6,3) (MEAN(KSET,J),J=1,I)
       READ (Z6,3) (SDEV(KSET,J),J=1,I)
2      CONTINUE
33     FORMAT (8F10.6)
3      FORMAT (8F10.4)
       READ (5,1) NL2SCS,NL2FCS
       WRITE (6,106) NL2SCS,NL2FCS
106    FORMAT ('1COEFFICIENTS, MEANS AND STD. DEVNS. FOR LEVEL TWO FACTOR
      1 SCORES FOLLOW.  THERE ARE',I3,' SCORES AND',I3,' FACTORS.',//)
       DO 102 I = 1,NL2SCS
       READ (Z8,33) (L2COF(I,J),J=1,NL2FCS)
102    CONTINUE
       REWIND Z5
       REWIND Z6
       REWIND Z8
       READ (Z9,3) (L2MEAN(I),I=1,NL2SCS)
       READ (Z9,3) (L2DEV(I),I=1,NL2SCS)
```

```
       REWIND 29
       READ (5,303) CONST1,CONST2
       WRITE (6,305) CONST1,CONST2
305    FORMAT ('1CONSTANTS FOR THE TWO FORMULAS ARE-',2F12.6,/)
303    FORMAT (2F12.6)
       NDCOF = 0
       DO 304 I = 1,9999
       READ (5,303) DCOF1(I),DCOF2(I)
       IF(DCOF1(I) .EQ. 9999.) GO TO 301
       WRITE (6,303) DCOF1(I),DCOF2(I)
304    NDCOF = NDCOF + 1
12     FORMAT (8F10.8)
C
C  BEGIN ACTUAL WORK HERE.  ALGORITHM:  READ THE RAW DATA FOR A T
C          AND DETERMINE WHETHER OR NOT THE STUDENT PASSES THE TESTS FOR
C          INCLUSION.   TESTS INCLUDE AGE, GROUP (ORIENTATION VS NON-
C          ORIENTATION), AND WEEK WHEN QUESTIONNAIRE WAS COMPLETED.
C          ASSUMING ACCEPTANCE:
C              1.   COLLECT THE RETURN CODE FOR LATER TESTING (RETCD= 3
C                   FOR STUDENTS RETURNING, 4 FOR "ATTRITORS".)
C              2.   FORMAT RAW DATA INTO "STUDNT" ARRAY SO THAT HIS
C                   QUESTIONNAIRE CAN BE SCORED.
C              3.   SCORE THE QUESTIONNAIRE BASED ON FIRST LEVEL FACTOR
C                   SCORES READ INTO PROGRAM DURING INITIALIZATION PHASE.
C              4.   USING THE SCORES JUST DEVELOPED CREATE SECOND LEVEL
C                   SCORES BASED ON SECONT LEVEL FACTOR SCORES READ INTO
C                   PROGRAM DURING INITIALIZATION PHASE.
C              5.   NOTE --- ALL SCORES MUSE BE STANDATDIZED, THUS THE
C                   NEED FOR MEANS AND STANDARD DEVIATIONS AT BOTH LEVELS.
C              6.   CALL THE PREDICTOR SUBROUTINE TO DETERMINE CHANCES
C                   OF DROPPING OUT.  SEE SUBROUTINE "PREDCT" FOR
C                   DOCUMENTATION.
C              7.   ACCUMULATE PREDICTED RESULTS ALONG WITH ACTUAL
C                   RETURN CODE (RETCD, ABOVE) FOR EACH STUDENT.  VALUES
C                   ARE ACCUMULATED IN THE ARRAY "RVALUE".
C              8.   AFTER ALL STUDENTS HAVE BEED READ, CALCULATE PERCENT
C                   OR CORRECT PREDICTIONS.
C
C
C  HERE GOES...READ THE FIRST STUDENT.
C
301    KSEQ = 0
       NSTDNT = 0
4      READ (17,5,END=9999) (RAWIN(I),I=1,156),FSTM,RDAMT,TRNSFR,
      1(RAWIN(I),I=157,221)
       KSEQ = KSEQ + 1
C  SKIP UNCODED RETURN CODES.
       IF (RETCD .EQ. 0) GO TO 4
5      FORMAT (9X,I1,I2,3I1,2I2,4I1,I2,2I1,2I2,8I1,I2,3I1,7I1,6I1,22I1,
      1/,10X,21I1,34I1,15I1,/,10X,6I1,8I1,7I1,T64,I1,I4,3A1,2I3,I1,
      2I2,/,10X,16I1,21I1,7I1,2I2,7I1,T69,I1,4I2,3I1)
C
C  SEE IF AGE AND TIME OF TEST IS OK.  TEST FOR RIGHT GROUP.
C
```

```
      IF (DEMO(2) .GT. IAGE2 .OR. DEMO(2) .LT. IAGE1) GO TO 4
      CALL TESTER (TEST,FT,WKS,IBRNCH,KSEQ,IVRFY)
      IF (IBRNCH .EQ. 0) GO TO 4
C
C  PASSED ALL TESTS.  INCLUDE AND COLLECT RETCD.  NOTE RETCD OF
C      2 OR 3 MEANS STUDENT RETURNED.
C
      NSTDNT = NSTDNT + 1
      IF (RETCD .EQ. 2) RETCD = 3
      RVALUE(1,NSTDNT) = RETCD
C
C  PICK OFF ACTUAL QUESTIONS (VS DEMOGRAPHICS, FINANCE, ETC) FROM
C      QUESTIONNAIRE.  FORMAT FOR LATER USE.
C
C
      DO 6 I = 1,NSETS
      INDEX = BEGPT(I)
      J = NSCOR(I)
      DO 6 K = 1,J
      STUDNT(I,K) = RAWIN(INDEX+K-1)
6     IF (STUDNT(I,K) .EQ. 9.) STUDNT(I,K) = MEAN(I,K)
C
C  SET FOR MISSING VALUES HERE.
C
      DO 66 K = 1,34
66    IF (STUDNT(4,K) .EQ. 0.) STUDNT(4,K) = MEAN(4,K)
C
C  INITIALIZE SCORE VALUES TO ZERO.  BEGIN SCORING STUDENT.
C
      IF (NSTDNT .LT. 11) WRITE (6,88) ((STUDNT(I,J),J=1,43),I=1,8)
      DO 7 INDEX = 1,45
7     FACSCO(INDEX) = 0
      INDEX = 0
C
C  ACTUAL WORK OF SCORING BEGINS HERE.  NOTE BASIC FORM OF SCORE:
C
C      FACTOR SCORE = SUMMATION OF FACTOR SCORE COEFFICIENTS TIMES
C                       STANDATDIZED SCOREDS.
C      WHERE STANDARDIZED SCORES ARE THE USUAL :
C                         STUDENT RESPONSE MINUS MEAN DIVIDED BY STD. DEV
C
      DO 8 KSET = 1,NSETS
      NSC = NSCOR(KSET)
      NFC = NFACT(KSET)
      DO 8 KFAC = 1,NFC
      INDEX = INDEX + 1
      DO 8 J = 1,NSC
8     FACSCO(INDEX     ) = FACSCO(INDEX     ) + COEFF(KSET,J,KFAC) *
     1((STUDNT(KSET,J) - MEAN(KSET,J)) / SDEV(KSET,J))
C
C  A STOP 10 IS DRASTIC... INDEX SHOULD ALWAYS END UP EQUAL TO NL2SCS.
C
      IF (INDEX .NE. NL2SCS) STOP 10
1001  FORMAT (3I8)
```

```
88      FORMAT (2X,43F3.0)
89      FORMAT (1X,12F10.6)
        DO 9 I = 1, NL2FCS
C
C   INITIALIZE FOR SECOND LEVEL SCORING HERE.
C
9       L2SCO(I) = 0
C
C   SCORE AT SECOND LEVEL HERE.  ALOGRITHM IS IDENTICAL TO FIRST LEVEL
C       EXCEPT THAT THE FACTOR SCORE COEFFICIENTS ARE NOW THE RESULT
C       OF THE SECOND LEVEL FACTOR ANALYSIS, AND THE STANDARDIZED
C       SCORES ARE A FUNCTION OF THE FACTOR SCORES CALCULATD ABOVE
C       AND THE MEANS AND STANDARD DEVIATIONS OF THE FACTOR SCORES
C       GENERATED AT THE TIME OF THE SECOND LEVEL FACTOR ANALYSIS.
C
        DO 10 KFAC  = 1,NL2FCS
        DO 10 KSCO = 1,NL2SCS
10      L2SCO(KFAC) = L2SCO(KFAC) + L2COF(KSCO,KFAC) *
     1                   (FACSCO(KSCO) - L2MEAN(KSCO)) / L2DEV(KSCO)
C
C   PICK UP DEMOS, MONEY,LYER,AND LEVEL 2 SCORES FOR PREDCT SUBROUT.
C
        INDEX = 1
        DO 203 I = 1,29
        SCORES(INDEX) = DEMO(I)
203     INDEX = INDEX + 1
        DO 204 I = 1,7
        SCORES(INDEX) = MONY(I)
204     INDEX = INDEX + 1
        DO 205 I = 1,16
        SCORES(INDEX) = LYER(I)
205     INDEX = INDEX + 1
        DO 206 I = 1,NL2FCS
        SCORES(INDEX) = L2SCO(I)
206     INDEX = INDEX + 1
        NPVALS = INDEX -1
C
C   SET MISSING VALUES FOR SCORES.
C
        DO 311 I = 1,NPVALS
311     IF (SCORES(I) .EQ. 9.0 .OR. SCORES(I) .EQ. 99.) SCORES(I) = 0
C
C    CALL PREDCT TO DO ACTUAL PREDICTION
C
        CALL PREDCT (SCORES,MAP,CONST1,CONST2,PVALUE,DCOF1,DCOF2,NDCOF,
     1NSTDNT,WT)
C       IF (NSTDNT .LT.11) WRITE (6,312) (SCORES(I),I=1,NPVALS)
312     FORMAT (20F6.2)
        DO 313 L = 1,NWTS
313     RVALUE(L+1,NSTDNT) = PVALUE(L)
        GO TO 4
C
C   ALL DONE SCORING STUDENTS NOW.  CALCULATE THE ACCURACY NEXT.
C
```

```
9999    WRITE (6,6781) IVRFY,IAGE1,IAGE2
        WRITE (6,24) KSEQ,NSTDNT.
        DO 9990 L = 1,NWTS
        W3CT = 0
        X3CT = 0
        X4CT = 0
        DO 20 I = 1,NSTDNT
        IF (RVALUE(1,I) .EQ. RVALUE(L+1,I)) GO TO 22
        IF (RVALUE(1,I) .EQ. 3) W3CT = W3CT + 1
        GO TO 20
22      IF (RVALUE(1,I) .EQ. 3) X3CT = X3CT + 1
        IF (RVALUE(1,I) .EQ. 4) X4CT = X4CT + 1
20      CONTINUE.
        T3 = W3CT + X3CT
        X = NSTDNT
        T4 = X - T3
        W4CT = T4 - X4CT
        XCT = X3CT + X4CT
        XW = X - XCT
        PERCNT = XCT / X
        X3P = X3CT / T3
        X4P = X4CT / T4
6781    FORMAT ('1VERIFY CODE (1=YES, USE BASE DATA; 0=NO, USE LIVE):',
       1I3,/,' LOWER AND UPPER AGE LIMITS ARE (INCLUSIVE):',2I4)
        WRITE (6,9989) WT(L)
9989    FORMAT ('0FOR THIS SIMULATION, SUM FOR ATTRITION WAS ADJUSTED BY
       1--',F6.1)
24      FORMAT ('0RECORDS READ=',I6,/,' RECORDS PROCESSED=',I5,/)
        I = 3
        WRITE (6,25) I,T3,X3CT,W3CT,X3P
25      FORMAT (' FOR RETURN CODE',I5,/,' TOTAL IN CATEGORY=',F6.0,/,
       1' CORRECTLY PREDICTED=',F6.0,/,' INCORRECT=',F6.0,/,
       2' PERCENT CORRECT=',F10.2,' PERCENT',/)
        I = 4
        WRITE (6,25) I,T4,X4CT,W4CT,X4P
        I = 9999
        WRITE (6,25) I,X,XCT,XW,PERCNT
C       WRITE (6,220) ((RVALUE(I,J),I=1,2),J=1,NSTDNT)
9990    CONTINUE
220     FORMAT (' RVALUE ARRAY --',/,(40I2))
        READ (5,1,END=9998) IVRFY,IAGE1,IAGE2
        READ (5,110) NWTS,(WT(I),I=1,NWTS)
        REWIND 17
        GO TO 301
9998    STOP 1
        END
        SUBROUTINE TESTER (TEST,FT,WKS,IB,KSEQ,IVRFY)
        INTEGER TEST,FT,WKS
        IB = 0
        KK = KSEQ / 10
        J = KSEQ - 10 * KK
        IF (IVRFY .EQ. 0) GO TO 2
        IF (J .LT. 3) GO TO 3
2       IF ( J .LT. 3 ) RETURN
```

```
3       IF (TEST .EQ. 1) GO TO 1
        IF (FT .EQ. 0 .AND. WKS .EQ. 3) IB = 1
        RETURN
1       IF (FT .EQ. 1) IB = 1
        RETURN
        END
        SUBROUTINE PREDCT (SCORE,MAP,CONST1,CONST2,PVALUE,DCOF1,DCOF2,ND,
       1NSTDNT,WT)
        DOUBLE PRECISION SCORE(100),CONST1,CONST2,DCOF1(40),DCOF2(40),
       1SUM1,SUM2,WT(19)
        INTEGER MAP(60),PVALUE(19)
        SUM1 = CONST1
        SUM2 = CONST2
        DO 1 I = 1,ND
        J = MAP(I)
        SUM1 = SUM1 + SCORE(J) * DCOF1(I)
1        SUM2 = SUM2 + SCORE(J) * DCOF2(I)
        DO 3 I = 1,19
        PVALUE(I) = 3
3       IF (SUM1 .LT. SUM2 + WT(I)) PVALUE(I) = 4
C       IF (NSTDNT .LT. 11) WRITE (6,2) SUM1,SUM2
2       FORMAT (' TOTALS',2F12.6,' FOR SCORES---',/)
        RETURN
        END
//GO.FT15F001 DD UNIT=DISK,DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),
//   DISP=SHR,DSN=W097EMS.COEFFS.FIRSTM,VOL=SER=USER02
//GO.FT16F001 DD UNIT=DISK,DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),
//   DISP=SHR,DSN=W097EMS.MEANS.FIRSTM,VOL=SER=TSOPAK
//GO.FT17F001 DD DSN=W097EMS.F78SURV2.DATA,DISP=SHR,UNIT=DISK
//GO.FT18F001 DD UNIT=DISK,DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),
//   DISP=SHR,DSN=W097EMS.COEFFS.CONTST,VOL=SER=USER01
//GO.FT19F001 DD UNIT=DISK,DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),
//   DISP=SHR,DSN=W097EMS.MEANS.CONTST,VOL=SER=TSOPAK
//GO.FT25F001 DD DSN=W097EMS.L2COFS.FIRSTM,DISP=SHR
//GO.FT26F001 DD DSN=W097EMS.L2MEANS.FIRSTM,DISP=SHR
//GO.FT28F001 DD DSN=W097EMS.L2COFS.CONTST,DISP=SHR
//GO.FT29F001 DD DSN=W097EMS.L2MEANS.CONTST,DISP=SHR
//GO.SYSIN DD *
```

APPENDIX IV

SAMPLE QUESTIONNAIRE FOR CONTINUING STUDENTS

'

Social Security Number	Sex Male ___ Female ___	Race
Major	Year of Birth	Approximate Grade Point Average
Married? Yes ___ No ___	Number of Children _____	Do you have any pre-school children? _____ Yes _____ No

Degree Sought _____ none at all _____ associate _____ Bachelor _____ Masters _____ Professional _____ PhD;EdD;DBA	Classification _____ unclassified _____ Freshman _____ Sophmore _____ Junior _____ Senior _____ Graduate _____ Other	Number of hours currently enrolled Approximate number of hours accumulated toward a degree _____

Number of hours spent each week in work for which you get paid		Annual Income

Date when you first attended this college   Mo.   Yr.

Date when you first attended any college   MO.   Yr.

Do you live on campus? _____	Do you live with your parents _____

Number of jobs that you presently hold ? _____	Are you employed by this college? _____	Are you employed by the financial aid office? _____

Total estimated income of your parents when you graduated from high school? _____ less than $6,000 ($2.88/hr.) _____ $6,000 - $10,000($2.89 - $4.80/hr.) _____ $10,000 - $15,000 ($4.81 - $7.21 /hr.) _____ $15,000 - $25,000 ($7.22 - $12.01/hr.) _____ Above $25,000 ($12.01 or more)	Did your Father attend college? _____ Did your Mother attend college? _____

While at college what is your
best guess that you will:

	Don't care	Not likely	Maybe	Probably	For sure
be elected to an office	□	□	□	□	□
join a social club	□	□	□	□	□
get married	□	□	□	□	□
get divorced	□	□	□	□	□
get on the honor role (Dean's List)	□	□	□	□	□
meet the Dean	□	□	□	□	□
meet the President	□	□	□	□	□
be invited to a faculty member's home	□	□	□	□	□
join an academic club	□	□	□	□	□
change majors	□	□	□	□	□
drop out of school for a semester or more	□	□	□	□	□
drop out of school several different times	□	□	□	□	□
graduate	□	□	□	□	□
decide that you've met your needs and therefore don't need more education	□	□	□	□	□
become angry at administrative requirements	□	□	□	□	□
Quit	□	□	□	□	□
try out for an athletic team	□	□	□	□	□
make an athletic team	□	□	□	□	□
attend cultural events	□	□	□	□	□

Page 2 (Continued)

	Don't care	Not likely	Maybe	Probably	For Sure
graduate with honors	☐	☐	☐	☐	☐
transfer before graduating	☐	☐	☐	☐	☐
flunk out	☐	☐	☐	☐	☐
fail a course	☐	☐	☐	☐	☐
have problems with a professor	☐	☐	☐	☐	☐
be inconvenienced by administrative error	☐	☐	☐	☐	☐
attend sports events	☐	☐	☐	☐	☐
have something of yours stolen	☐	☐	☐	☐	☐
other _____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

I am presently having the following
problems and they will affect my
educational progress

Major Problem ─┐
Moderate Problem─┐
Minor problem ─┐
Not a problem ─┐

	Not a problem	Minor	Moderate	Major
a. low grades	☐	☐	☐	☐
b. courses too difficult	☐	☐	☐	☐
c. not enough electives related to my interests	☐	☐	☐	☐
d. courses needed are not available at this college	☐	☐	☐	☐
e. want a vacation	☐	☐	☐	☐
f. courses offered are not related to my cultural background	☐	☐	☐	☐
g. scheduling courses	☐	☐	☐	☐
h. don't like my major department	☐	☐	☐	☐
i. not even sure I've picked the right major	☐	☐	☐	☐
j. course work too easy	☐	☐	☐	☐
k. bad study habits	☐	☐	☐	☐
l. job conflicts with school	☐	☐	☐	☐
m. need a job	☐	☐	☐	☐
n. can't find a job	☐	☐	☐	☐
o. don't have enough money for school	☐	☐	☐	☐
p. applied, but can't get financial aid	☐	☐	☐	☐
q. financial aid insufficient	☐	☐	☐	☐
r. child care costs alot	☐	☐	☐	☐
s. school is too expensive	☐	☐	☐	☐
t. study is too time consuming	☐	☐	☐	☐
u. too many other responsibilities	☐	☐	☐	☐
v. no extra-curricular activities related to my interests	☐	☐	☐	☐

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Major Problem

Moderate Problem

Minor problem

Not a problem

w. personal problems

x. no administrators or falculty to relate or discuss problems

y. going to move to another area

z. going to get married

aa. can't get child care

bb. not sure why I'm here

cc. I have no friends here

dd. I have no (or few) persons of similar cultural background to relate

ee. I don't feel part of the College

ff. just don't like college

gg. just don't like this College

hh. inconvenient to get here

ii. I feel discriminated against because of race

jj. I feel discriminated against because of sex

kk. I feel discriminated against because of age

2. Why Are You Here?

The following reflect typical reasons why
students enter college. Please indicate
the importance of each to you.

		NOT A REASON	MINOR REASON	MEDIUM REASON	MAJOR REASON
a.	to increase my knowledge in my academic field	☐	☐	☐	☐
b.	to discover my vocational interest	☐	☐	☐	☐
c.	to prepare for a new career	☐	☐	☐	☐
d.	to prepare for graduate school	☐	☐	☐	☐
e.	to increase my chances for a raise or promotion in my present job	☐	☐	☐	☐
f.	to learn specific skills that will enrich my daily life	☐	☐	☐	☐
g.	to improve my ability to get along with people	☐	☐	☐	☐
h.	to become actively involved in student life and campus activities	☐	☐	☐	☐
i.	to increase my participation in cultural and social events	☐	☐	☐	☐
j.	to improve my knowledge and skills required in my present job	☐	☐	☐	☐
k.	to improve my self image	☐	☐	☐	☐
l.	to meet people	☐	☐	☐	☐
m.	to improve my leadership skills	☐	☐	☐	☐
n.	to improve my life style	☐	☐	☐	☐
o.	to learn about things	☐	☐	☐	☐
p.	to satisfy my curiosity about areas of knowledge	☐	☐	☐	☐
q.	to increase my intelligence	☐	☐	☐	☐
r.	my parents said so	☐	☐	☐	☐
s.	avoid getting a job	☐	☐	☐	☐
t.	nothing else to do	☐	☐	☐	☐

How important are the following
areas of support for your education ?

	NO SUPPORT	MINOR SUPPORT	MODERATE SUPPORT	MAJOR SUPPORT
a. your own earnings or savings	☐	☐	☐	☐
b. parents	☐	☐	☐	☐
c. spouse's income	☐	☐	☐	☐
d. repayable loans	☐	☐	☐	☐
e. scholarships, grants, other gifts	☐	☐	☐	☐
f. G.I. Bill	☐	☐	☐	☐
g. other _____	☐	☐	☐	☐
_____	☐	☐	☐	☐

How often do you go to the:

I'm almost always there
A lot
Sometimes
Almost never
I never go there

a. campus or student center

b. Pub or campus bar

c. study rooms

d. game rooms

e. library

f. gym

g. other _____

h. other _____

How frequently do you attend:

Almost always
A lot
Sometimes
Almost never
Never

a. campus religious services

b. student government meetings

c. student social club meetings

d. academic club meetings

e. other student meetings

f. other _____

g. other _____

How satisfied are you with your
experiences in the following areas?

		Don't care or doesn't apply	Very dissatisfied	Somewhat dissatisfied	Satisfied	Very satisfied
a.	Admissions Office services	□	□	□	□	□
b.	Registrar's Office services	□	□	□	□	□
c.	Financial Aid	□	□	□	□	□
d.	non Falculty Academic Advising	□	□	□	□	□
f.	Counseling Center - academic advising	□	□	□	□	□
g.	Counseling Center - general	□	□	□	□	□
h.	Career Development/Placement	□	□	□	□	□
i.	Food Service	□	□	□	□	□
j.	Recreation and Athletic facilities	□	□	□	□	□
k.	Library	□	□	□	□	□
l.	Health Services	□	□	□	□	□
m.	Housing Facilities	□	□	□	□	□
n.	Social Activities	□	□	□	□	□
o.	Business Office	□	□	□	□	□
p.	Day Care Services	□	□	□	□	□
q.	Campus Center	□	□	□	□	□
r.	Other _____	□	□	□	□	□
	_____	□	□	□	□	□

How satisfied are you with your
experiences in the following areas:

		Don't care or doesn't apply	Very dissatisfied	Somewhat dissatisfied	Satisfied	Very Satisfied
a.	courses in your major	☐	☐	☐	☐	☐
b.	required courses	☐	☐	☐	☐	☐
c.	electives	☐	☐	☐	☐	☐
d.	quality of instruction	☐	☐	☐	☐	☐
e.	availability of courses that you want (frequency of offering)	☐	☐	☐	☐	☐
f.	availability of courses that you want (time of scheduling)	☐	☐	☐	☐	☐
g.	accessibility of instructors	☐	☐	☐	☐	☐
h.	helpfulness of instructors in assisting you with career plans	☐	☐	☐	☐	☐
i.	faculty academic advising	☐	☐	☐	☐	☐
j.	other _____	☐	☐	☐	☐	☐
	_____	☐	☐	☐	☐	☐

a. Who is the president of the Student Government Association? _____

b. Who is your Academic Advisor? _____

c. What is the name of the President of the College? _____

d. What is the name of the Dean of the College? _____

e. How much time did you spend with your academic advisor planning your
    schedule for this semester?

    No time _____   5-10 Min _____   10-30 Min _____   30-60 Min _____

f. I Mostly came to campus for class only and don't care about social and
    culural events.

    True _____   False _____

g. In the past I have interrupted my education for a semester or more:

    _____ 0 times   _____ 2 times   _____ more than 3 times

    _____ 1 time   _____ 3 times

h. Except for classes, I never come to campus on weekends.

    True _____   False _____

i. If you do not live on campus, about how many different times a week do
    you come to campus? _____ .   These visits are:

    Mostly day _____   Mostly night _____   About equally divided _____

j. Finally, would you agree to participate in a follow-up study next
    semester ? (the follow-up will not take any more of your time than
    this study)

    _____ definitely yes   _____ probably yes   _____ probably no

    _____ absolutely not

Thank you for your time and cooperation.

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Abstract

The purpose of the study was to determine whether the variables related to students' goals, reasons for attending college, academic background, socioeconomic background, basic demographic characteristic, expectations about college, source of financial support, participation in college activities, use of college facilities, and college choice criteria could be successfully incorporated into a multi-variate analysis capable of predicting attrition at an urban institution. Central to the study was a test of Tinto's theoretical model of attrition, a model that suggests in part that while background characteristics are important in predicting attrition, student expectational and motivational attributes are at least equally important. Equally important was a test of the suggestion, which appears in virtually every synthesis of the literature, that the attrition phenomenon is multi-faceted.

The college used for the study is an urban, commuting institution with a large percentage of non-traditional students. Two groups of students were identified—students who attended the orientation program and continuing students. Parallel questionnaires were administered to each group. A total of 1314 students responded. Factor analytic techniques were used to reduce the items in the questionnaires to a set of predictor variables.

A model was developed to predict which students would or would not persist in the college studies. Discriminant analyses were used to determine which variables from the questionnaire to use in the model.

The model demonstrated that for the college being studied, attrition is indeed a multi-faceted phenomenon. Twenty different variables entered into the prediction formulas for orientation students, ages 17–21, 22 for continuing students ages 17–21, and 18 for continuing students, ages 22–45. The model demonstrated that for the college being studied, the congruency model proposed by Tinto can be accepted. Some background characteristics entered the prediction formulas for non-traditional and traditional students, and expected involvement factors played an important role for orientation students, satisfaction factors for continuing traditionally aged students, and job related factors for continuing non-traditional students. The model also demonstrated that the variables that predict attrition for the non-traditional students are not the same as the variables which predict attrition for traditional students. In a purely quantitative sense, five variables that entered the prediction formulas for non-traditional students did not enter the formulas for either of the traditionally aged students, and 23 variables which entered the formulas for traditionally aged students did not enter the formula for non-traditional students.

Finally, Tinto's model generally agrees with the basic congruency argument proposed by (among others) Feldman and Newcomb, with the exception that Tinto emphasizes background characteristics to a greater extent than do earlier versions of the concept. The model developed in this study incorporated this increased emphasis and expanded Tinto's model to

include current environmental factors which are completely separate from the college environment. Acceptance of the model may suggest that a congruency model for non-traditional institutions must incorporate factors related to expectations and motiviation, variables describing background, and factors or variables which relate to a student's environment external to the college. In one sense, as these external factors change, the commitment to complete college changes--thus a model where motivational factors dominate may be appropriate. In a non-traditional environment, however, external factors may play a more dominant role than in a traditional enviroament, thereby requiring a more direct incorporation of these factors into the model.

At the college used in this study the congruency model seems appropriate for orientation students and for non-traditional students. For the traditional, continuing student, however, the model proposed by Astin seemed more appropriate, suggesting that satisfaction and involvement in college may be more important than motivation and expectations about college for the traditional student.